

W. N. S. J. O. C.
EPITOME
Part OF THE *Realist*
Art of Navigation.

CONTAINING

The Doctrine of Plain and Spherical Triangles; and their Use and Application in Plain Sailing, Mercator's Sailing, and Great Circle Sailing, as also in Astronomy and Geography, and Rules for finding the Variation of the Compass, and correcting the Course.

TOGETHER WITH

Tables of the Sun and Stars Right Ascension and Declination, Of the Latitude and Longitude of Places, Of Meridional Parts. Likewise a Traverse Table, A Perpetual Almanack; and other things very useful in the Art of Navigation.

And the Logarithm Sines and Tangents, with the Logarithms of Natural Numbers, from 1 to 10600, according to those exact Tables formerly set forth,

By **HENRY GELLIBRAND.** *K*

Corrected and Enlarged with many Additions,
By **JAMES ATKINSON**, Teacher of Navigation.

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BOOKS of Navigation, Printed for Rich. Mount.

- T**HE Mariner's Magazine; by Capt. *Samuel Sturmy*.
The Coasting Pilot for England, Scotland, Ireland, &c.
English Pilot for the Channel. English Pilot for the
Northern Seas. English Pilot for the Straights. English
Pilot for the *West-Indies*. English Pilot for *Guinea*.
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CHAP. I.

Containing some necessary Geometrical Problems.

Prob. 1. *To erect a Perpendicular on the middle of a Line given.*

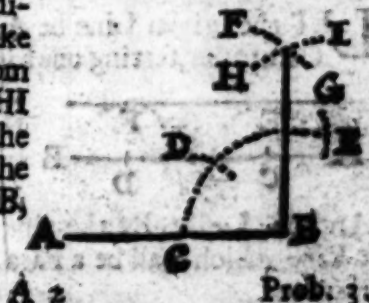
LET the Line given be AB, and the middle point be C; that is, AC is equal to CB.
Set one foot of the Compasses in A, and extend the other foot to some distance greater than AC, and with that distance make aloft the Arch DE, with the same distance set one foot in B, and cross the Arch DE, by the place of Intersection of those two Arches and the point C, draw the Line to C, so shall this Line be the Perpendicular as was required.



Prob. 2. *To erect a Perpendicular on the end of a Line given.*

LET the given Line be AB, and on the end B 'tis required to raise a Perpendicular.

Set one foot of the Compasses in B, and with any distance make the Arch CDE; then with the same distance, setting one foot in C, cross that Arch in D, and keeping one foot there, with the same distance make aloft the Arch FG, and also cross the Arch CDE in E, and taking off the Compasses from D, set one foot of the Compasses in E, (keeping them at the same distance) with the other foot make aloft the Arch HI. Lastly, from the Intersection of the Arch HI with FG, draw a Line to the point B, so shall this Line be the Perpendicular upon the end B, as was required.

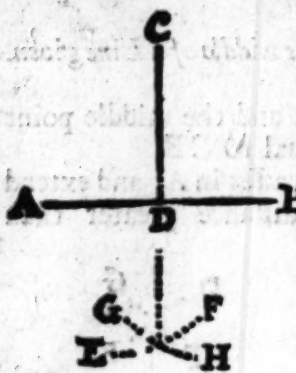


A 2

Prob. 3.

Prob. 3. To let fall a Perpendicular from a Point over the middle of a Line given.

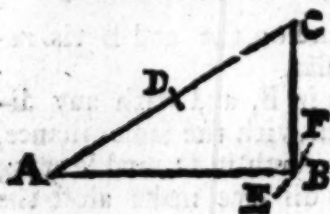
LET the given Line be AB, and the point aloft over the middle thereof be assigned C.



Extend the Compasses from A to C, and keeping one foot in A, with the other make the Arch FE; and with the same distance one foot being in C, cut the Line AB in B; then with the same distance set one foot in B, and with the other make the Arch GH. Lastly, From the point C, and the Intersection of the Arches GH and FE, draw the Line CD, so shall CD be the Perpendicular let fall as was required.

Prob. 4. To let fall a Perpendicular from a Point assigned, near or directly over the end of a Line given.

LET the given Line be AB, and Point assigned C. Draw the Line CA, which divide into two equal parts in D;



then with the distance DA, setting one foot in D, with the other make the Arch FE, crossing the given Line in B; then from C draw the Line CB, which shall be a Perpendicular let fall as was required.

Prob. 5. To draw a Line Parallel to a Line given.

LET the given Line be AB, with any distance of the Compasses, setting one foot in C taken at pleasure, with



the other make the Arch E; then with the same distance likewise at D, set one foot, and with the other make aloft the Arch F. Lastly, By the tips of the Arches E and F, draw a Line which shall be a Parallel to the Line given, as was required.

Prob.

Geometrical Problems.

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Prob. 6. To draw a Line Parallel to a given Line, which shall pass through a Point assigned over the given Line.

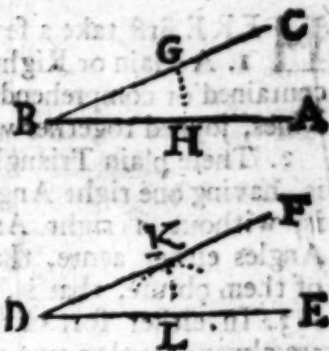
LET the given Line be AB, and the Point assigned C. Set one foot of the Compasses in C, and extend the other to the nearest distance of the Line AB; then taking off the Compasses, and keeping them at the same distance, from any point taken towards the end A of the given Line, as at D, and setting one foot in D, with the other make the Arch EF. Lastly, by the point C, and the tip of the Arch EF, draw a line, which shall be parallel to the given Line AB, and pass through the assigned point C as was required.



Prob. 7. An Angle being given, to make another equal thereto.

LET the given Angle be ABC, and 'tis required to make another equal thereunto.

Draw the Line DE at pleasure, then setting one foot of the Compasses in B with any distance, make the Arch GH crossing BC in G, and also crossing BA in H; then keeping the Compasses at the same extent, set one foot in D, and with the other make the Arch LK; That done, take off the distance GH, and with this distance, setting one foot in L, with the other cross the Arch LK in K. Lastly, by D and K draw the Line DKF, so shall the Angle EDF be equal to the Angle ABC as was required.



Prob. 8. To bring any three Points not lying in a right Line, into the Circumference of a Circle.

LET the three Points be A, B, C, and 'tis required to make a Circle to pass through them.

Set one foot in A, and extend the other to more than half

A 3

Of Right Angled Triangles.



half towards B; and with that distance make the Arch DE; then with the same distance, setting one foot in B, with the other cross the Arch in D and E, and draw DE long enough: That done, if the Compasses likewise stand at more than half the distance of BC, set one foot in C, and with the other make the Arch FG; and with the same distance, setting one foot in B, with the other cross the said Arch FG in F and G, and draw the Line FG to cross DE in H, so shall H be the Center: Therefore setting one foot in H, and extending the other to either A, B, or C, with the other make a Circle, which shall pass through all the three Points assigned A, B, and C, as was required.

C H A P. II. *Containing the Doctrine of Plain Triangles, Right and Oblique Angled. Triangles are either Plain or Spherical. Of Plain or Right-lined Triangles.*

HERE first take a few general Rules about them.

1. A Plain or Right lined-Triangle, is a plain Figure contained or comprehended within three right or streight Lines, joyned together with three Angles or Corners.

2. These plain Triangles are either Right-angled, that is, having one right Angle; or else Oblique-angled, that is, without a right Angle, and having all the three Angles either acute, that is, less than 90 d. or else one of them obtuse, that is, more than 90 d.

3. In either sort of these Triangles, the three Angles are always equal to two right Angles, that is, 180 d.

4. In a Right-angled Triangle, the right Angle being always 90 d. the other two Angles make also just 90 d. in such manner that one is the Complement of the other; so that one of them being known, the other is also known.

5. The Lines about the right Angle, some call them Sides, some Legs: But in Right-angled Triangles, for better distinction, we call BA the bottom line, the Base;

AC

Of Right Angled Triangles.

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AC the upright line, the *Perpendicular*, and BC the *Slope*-line, the *Hypotenuse*. See Plate I. (1.) (2.)

6. Every Triangle hath six parts, to wit, three Sides, and three Angles, and these are all proportional one to another, so that any three of them being known, the other three may be found out; unless it be the three Angles of a plain Triangle, which only shews the Proportion of the sides, but you may make one side what length you will.

How these Triangles are made, see *Atkinson's Epitome of the whole Art of Navigation*.

(I.) Of Right angled Plain Triangles.

CASE I. Plate I. Triang. I.

The Angles, and one side of a Right-angled Triangle being given, to find the other sides.

Example. In the Right-angled Triangle BAC, the Angle at A being known to be a right Angle or 90 d. and the Angle at B being known to be 36 d. 52 m. and the side BC being known to be 350 Inches, Feet, Yards, Poles, Miles, Leagues, or any other kind of measure; how may I find hereby the other two sides?

The Angle at C is known by the 4th Rule foregoing; and so this being a Right-angled Triangle, the Angle at C is the Complement of the Angle at B. Take therefore the Angle B, 36 d. 52 m. out of 90 d. and there rests for the Angle at C, 53 d. 8 m.

To find the side CA, work by this general proportion.

As the Sine of any Angle, to the Side oppos'd thereunto: So is the Sine of any other Angle, to the side oppos'd thereunto.

And so on the contrary, *As any side, is to the Sine of the Angle oppos'd thereunto: So is any other side, to the Sine of the Angle oppos'd thereunto.*

So that in this Triangle BAC, having the side BC 350 oppos'd to the Angle at A 90 d. you may thereby find the side AC, which is oppos'd to the Angle at B, that Angle being known to be 36 d. 52 m. for,

As the Radius or Sine of the Angle at A 90 d. 10.0000000

To the opposite side BC, 350 ————— 2.5440680

So is the Sine of the Angle at B 36 d. 52 m. — 9.7781186

To the opposite side AC, 210 ————— 42.3221866

A 4

Add

Of Right angled Triangles.

Add the second and third Numbers together, and from the Sum subtract the first, which because it is the Radius, it is done by cancelling the first Figure, so the Remainder is 2.3221866, which is the Log. of 210 for the side desired.

Plate I. Triang. I.

By the same Rule you may find the side BA, which is yet unknown, by its proportion to the opposite Angle at C, which is 53 d. 8 m.

As the Radius or Sine of 90 d. —————	10.0000000
To the side opposed BC, 350 —————	2.5440680
So is the Sine of the Angle C, 53 d. 8 m. ———	9.9031084
To the Side BA, 280 —————	2.4471764

Which cancelling the Radius, the Remainder is the Logarithm of 280, for the Side BA; and thus you have all the six parts of the Triangle.

Case II. Plate I. Triang. II.

Two Sides, one of them opposite to the right Angle, being given; to find the Angles and third Side.

The right Angle being opposed unto one of the given Sides, you may work by the proportion of the opposite Sides and Angles, For

As any known Side, to the Sine of the Angle opposed thereunto: So is any other Side, to the Sine of the Angle opposed thereunto.

Example. In the Triangle ABC, let the two given sides be AB, 280, and BC 350, which side BC, is opposed to the Angle A, being known to be 90 d.

First, To find the Angle at C, opposed to the side AB.

As the Side BC 350 Log. —————	2.5440680
To the Sine of the opposite Angle A, 90 d. —	10.0000000
So the side AB, 280 —————	2.4471580

Sum 12.4471580

To the Sine of the Angle C, 53 d. 8 m. —————	9.9030900
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Add the second and third Numbers, and from the Sum thereof subtract the first, the Remainder is the Sine of the Angle desired, which is 53 d. 8 m. almost.

Secondly, Now this Angle being known, the Angle at B is the Complement thereof; which is 36 d. 52 m.

Plate

Plate I. Triang. II.

Thirdly, for the side CA, having found the opposite Angle at B to be 36 d. 52 m. you may find it as before, in the last Proposition.

As the Radius or Sine of the Angle at A 90d. 10.000000
 To the opposite side BC 350 ————— 2.5440680
 So is the Sine of the Angle at B, 36 d. 52 m. - 9.7781186
 To the side AC 210 ————— 2.3222193

Case III. Plate I. Triang. III.

In a Right-angled Triangle, the two sides including the right Angle being given, to find the Angles and third side.

Example. In the Triangle BAC, suppose the side BA to be 280, and the side AC to be 210, and the Angle A between them to be a right Angle 90 d. to find the other parts of this Triangle.

You may make either side the Radius, but we will suppose the side BA to be the Radius; so the side AC is the Tangent of the Angle at B, and the Angle at C is the Compl. of the Angle at B. First, To find the Angle B.

As the one side BA, 280 Log. ————— 2.4471580
 To the other side AC, 210 ————— 2.3222193
 So is the Radius Tang. 45d. ————— 10.0000000
 Sum 12.3222193

To the Tangent of 36 d. 52 m. 9.8750613

Which is the Angle at B, the Complement whereof being 53 d. 8 m. is the Angle at C. Then for the side BC.

Plate I. Triang. III.

As the Sine of the Angle B, 36 d. 52 m. — 9.7781186
 To its opposite AC 210 ————— 2.3222193
 So the Radius, or Sine of 90 d. ————— 10.0000000
 Sum 12.3222193

To its opposite side BC 350 ————— 2.5440680

Thus much for Plain Right Angled Triangles.

(II.) Of

(II.) Of Oblique Triangles.

Case I. Plate I. Triang. IV.

Two Angles of an Oblique Triangle being given, and a side opposed to either of them, to find the other sides.

Example. In the Triangle ABC, the Angle at A is 30 d. the Angle at B is 45 d. and the side BC is 290. To find the rest of the parts of this Triangle. The Angle C is the Complement of the other two Angles to 180; for the three Angles, always make 180 d. as in the third Rule: So that these two Angles A, being 30 d. and B 45 d. being added together, make 75 d. and their Complement to 180, being 105 d. is the Angle at C.

The Angles being all thus known, the sides unknown may be found as follows. To find the side AC.

As the Sine of the Angle A 30 d. —————	9.6989700
To the Side opposed to it CB 290. —————	2.4623980
To the Sine of the Angle B 45 d. —————	9.8494850
Sum of the second and third —————	12.318830
To the opposite side AC 410 —————	2.6129130

In such cases as these, when you have Sine or Tangent, in the first place, you may work by the Arithmetical Complement thereof, and so save the Substraction, as shall be shewn in the use of the Logarithms, preceeding the Table of Logarithms.

Then to find the other side AB, by the opposite Angle at C, which is 105 d. Here because the Angle exceeds 90 d. you must take the Complement to 180, which is 75.

As the Sine A 30 d. Arith. Compl. —————	0.3010300
To the side opposed CB 290 —————	2.4623980
So is the sine of 75 d. or 105 deg. —————	9.9849428
To the side opposed AB 560 $\frac{1}{2}$ —————	2.7483718

Thus you have all the parts of the Triangle.

Of Oblique Triangles.

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Case II. Plate I. Triang. V.

Two sides of an Oblique Triangle, and an Angle opposed to one of them being given, to find the other Angles and a third side.

This is but the Converse of the former.

Example. In the Triangle ABC, let the sides given be AC 410, and CB 290, the Angle opposed at A 30 d. to find the Angle B.

As the side CB 290 Compl. Arith. ————— 7.5376020

To the Sine of the opposed Angle A 30 d. ——— 9.6989700

So the side AC 410 ————— 2.6127839

To the Sine of the opposed Angle B ————— 19.8493559

Which is 44 d. 59 m.

Now the Angle A being 30 d. and B 44 d. 59 m. which make 74 d. 59 m. the Angle C must be 105 d. 1 m. the Complement to 180, and the side AB opposed thereto, may be found as in the first Case 560.

Case III. Plate I. Triang. VI.

Two sides of an Oblique Triangle, with the Angle contained between them, being given, to find the other Angles and sides.

In the Triangle ACD, let the side AC be 410, and the side AD 560, and the Angle between them at A 30 d. and it is required to find the other two Angles, and the side CD.

To resolve this Oblique Triangle, it is a plain way to reduce it into two right-angled Triangles, by letting fall the Perpendicular CB from the Angle C.

First, in the right-angled Triangle ABC, you have the Hypotenusal AC 410, and the Angle at A 30 d. Therefore as in Case I.

As S. B 90 d. to AC 410 | And as AB 355 to Tang. ACB 60 d.

So S. C 60 d. to AB 355 | So BD 205 to Tang. ECD. 45 d.

The Angles ACB and DCB, make the Angle ACD 105 d. and therefore the Angle at D is 45 d.

Another way to perform this more usual.

Take the Sum of the two sides, and } Side AD — 560
difference of them, and work thus } Side AC — 410

AD and AC added, their ————— Sum is 970

AC subtracted from AD, their ————— Diff. is 150

Then

Of Oblique Angles.

Then saying thus :

As the Sum 570 Arith. Compl. ————— 7.0132283
 To the Diff. of the two sides 150 ————— 2.1760913
 So Tang. of half the Sum of the Ang. unk. 75 deg. 10. 5719475
 To Tang. of the diff. of half Ang. 29 deg. 59 min. 19.7612671
 This added to half the Sum of the Angles d. m.
 unknown, shews the greater Angle to be 104 } 75. 0
 deg. 59 min, and subtracted from it, shews } 29 59
 the less Angle to be 45 deg. 1 min. }
 And thus having all the Angles, you may } ACD 104 59
 find the unknown side CD, by Case I. } ADC 45 1

Case IV. Plate I. Triang. 7.

Having three sides of an Oblique Triangle, to find the Angles.

In the Triangle ACD, suppose the greater AC — 410
 side AD be 560, the two lesser sides — } CD — 290

The Sum of these two 700

The difference of them 120

As the greatest side 560 Comp. Arith. ————— 7.2518120

To the Sum of the two lesser 700 ————— 2.8450980

So the diff. of them 120 ————— 2.0791812

To a fourth number 150 AE ————— 12.1760712

This 150 is AE, a part of the greatest side, which be-
 ing subtracted from it, the Perpendicular will fall in the
 middle of the Remainder, and so part ECD in two right-
 angled Triangles.

Thus the greater side AD being ————— 560

The part to be subtracted AE ————— 150

There remains ED ————— 410

The half whereof is BD ————— 205

which is the place where the Perpendicular CB falls, and
 is the Base of the lesser Triangle DBC; and this subtract-
 ed from the greater side, leaves 355 for the Base of the
 greater Triangle ABC.

Now having these two Bases of these two Triangles, and
 their Hipotenuses 410, and 200 given before, you may by
 the second Case find all the Angles.

1. In the Triangle ABC .

As AC , 410, to Sine ABC 90 deg.

So AB , 355, to Sine ACB 60 deg.

The Complement whereof is the Angle CAD 30 deg.

2. Then in the Triangle CBD .

As CD 290, to Sine CBD 90 deg.

So BD 205, to Sine BCD 45 deg.

Whose Complement is the Angle at ADC 45 deg.

Thus in the first Triangle ACD , we have found the Angle at A to be 30 deg. the Angle at D to be 45, and the two Angles at C to be 60 deg. and 45 deg. the Sum 105 deg, for the Angle ACD .

CHAP. III.

Containing the Doctrine of Spherical Triangles.

Here likewise you may take a few general Rules for the better understanding these Triangles.

1. These Spherical Triangles consist of 6 parts, that is, three Sides and three Angles, any three of which being known, the rest may be found.

2. The three Sides of a Spherical Triangle are Arches of three great Circles of a Sphere, and as the sides of plain Triangles are measured by a Scale of equal parts, so these are to be measured by an Arch of equal degrees of a great Circle.

3. A great Circle divides the Sphere or Globe into two equal parts; as the Equinoctial, the Ecliptick, and the Meridians, &c.

4. The Sum of the sides of a Spherical Triangle are less than two Semicircles.

5. The Sum of the three Angles of a Spherical Triangle, are greater than two right Angles, but less than six.

6. A Spherical Triangle is either Rectangular or Oblique-angular.

7. The

14 Of Right Angled Spherical Triangles.

7. The Sines of the Angles are proportional to the Sines of their opposite sides; and on the contrary, the Sines of the sides are proportional to the Sines of their opposite Angles.

8. In right angled Triangles the side opposite to the right Angle is called the Hypotenuse, the other two are called Legs.

Of Right-angled Spherical Triangles.

Case I. Plate II. Triang. I.

The Hipotenuse, and one of the Oblique angles being known, to find the Leg opposite to that Angle.

In the Right-angled Triangle *ABC*, *AC* is 30 deg. and the Angle at *A* 23 d. 30 m. It is required to find the Leg *BC* Opposite to the Angle at *A*.

For the Making and Measuring all the parts of any Spherical Triangle, see *Atkinson's Epitome*, where it's large and methodically Taught.

As the Radius or Sine of 90 d. ————— 10.0000000
 To the Sine of the Hipotenuse *AC* 30 d. ——— 9.6989700
 So the Sine of the opposite Angle *A* 23 d. 30 m. — 9.6006997
 To the Sine of the Leg *BC* 11 d. 30 m. ——— *X*9.2996697

Case II. Plate II. Triang. II.

The Hipotenuse and one of the Oblique Angles being known, to find the Leg adjacent to that Angle.

As the Radius, to the Co-sine of the Angle known;
 So the Tangent of the Hipotenuse, to the Tangent of the Leg required.

As the Radius or 90 deg. ————— 10.0000000
 To the Co-sine of *A*, Cos. 23, 30. or Sine 66 d. 30 m. 9.9623978
 So the Tangent of *AC*, Tang. 30 deg. ——— 9.7614394
 To the Tangent of *AB*, 27 deg. 54 min. ——— *X*9.7238372

Case III. Plate II. Triang. III.

The Hipotenuse and one of the Oblique Angles being known, to find the other Oblique Angle.

As

Of Right Angled Spherical Triangles. 15

As the Radius, to the Co-sine of the Hypotenuse ;
So is the Tangent of the Angle given, to the Co-tang.
of the Angle required.

Case IV. Plate II. Triang. IV.

The two Legs being given, to find the Hypotenuse.

As the Radius, to the Co-sine of one of the Legs ;
So is the Co-sine of the other Leg, to the Co-sine of
the Hypotenuse.

Case V. Plate II. Triang. V.

The two Legs being given to find either of the Oblique Angles.

As the Sine of the Leg next the angle required, is to
the Radius ;

So is the Tangent of the opposite Leg, to the Tangent
of the angle required.

Or thus : As the Radius, is to the Sine of the Leg next
the angle required ;

So is the Tangent Complement of the opposite angle,
to the Tangent Complement of the angle required.

Case VI. Plate II. Triang. VI.

*One of the Legs, and the Oblique Angle next it being given,
to find out the Hypotenuse.*

As the Co-sine of the angle given, is to the Radius,
So is the Tangent of the Leg given, to the Tangent of
the Hypotenuse.

Case VII. Plate II. Triang. VII.

*One of the Legs and the Angle next it being known, to find
the other Leg.*

As the Radius, to the Tangent of the angle given ;

So is the Sine of the Leg given, to the Tangent of the
Leg required.

Case VIII. Plate II. Triang. VIII.

*One of the Legs and the Oblique Angle next it being given,
to find the other Oblique Angle.*

As the Radius, to the Sine of the angle given ;

So is the Co-sine of the given Leg, to the Co-sine of
the angle required.

Case

Case IX. Plate II. Triang. IX.

One of the Legs, and the Angle opposed to it being known, to find the Hypotenuse.

As the Sine of the given angle, to the Sine of the given Leg;
So is Radius, to the Sine of the Hypotenuse required.

Case X. Plate II. Triang. X.

One of the Legs, and the Angle opposite thereto being given, to find the other Leg.

As the Radius, to Tangent of the given Leg;
So is the Tangent Complement of the given angle, to the Sine of the Leg required.

Case XI. Plate II. Triang. XI.

One of the Legs, and an Angle opposite thereto being given, to find the other Oblique Angle.

As Sine Compl. of the given Leg, is to the Radius;
So is the Sine Complement of the given Angle, to the Sine of the Angle required.

Case XII. Plate II. Triang. XII.

The Hypotenuse and one of the Legs being given, to find the Angle adjoining to the given Leg.

As Radius, to the Tangent Compl. of the Hypotenuse;
So is Tangent of the given Leg. to the Sine Complement of the Angle required.

Case XIII. Plate II. Triang. XIII.

The Hypotenuse and one of the Legs given, to find the Angle opposite to the given Leg.

As the Sine of the Hypotenuse, is to Radius;
So is the Sine of the given Leg, to the Sine of the Angle required.

Case XIV. Plate II. Triang. XIV.

The Hypotenuse and one of the Legs being given, to find the other Leg.

As Sine Complement of the given Leg, is to Radius;
So is the Sine Complement of the Hypotenuse, to the Sine Complement of the Leg required.

Case

Of Right Angled Spherical Triangles. 17

Case XV. Plate II. Triang. XV.

The two Oblique Angles being given, to find the Hipotenuse.

As the Tangent of one of the Angles, is to the Radius;

So is the Co-tangent of the other Angle, to the Co-sine of the Hipotenuse.

Or thus: As the Radius, is to the Tangent Complement of one Angle;

So is the Tangent Complement of the other Angle, to the Sine Complement of the Hipotenuse.

Case XVI. Plate II. Triang. XVI.

The two Oblique Angles being given, to find either of the Legs.

As the Sine of the Angle adjacent to the Leg required, is to the Co-sine of the other Angle;

So is Radius, to the Co-sine of the Leg sought.

Of Oblique Spherical Triangles.

Case I. Plate II. Triang. I.

Two Angles, and a side opposite to one of them, being given, to find the side opposed to the other.

As the Sine of the Angle opposed to the side known,

To the Sine of the given side;

So is the Sine of the other Angle opposed,

To the Sine of the side required.

Example. In the Triangle ADE having the side AD 30 d. the Angle at A 23 d. 30 m. and the Angle at E 38 d. 30 m. to find the side DE .

As Sine AED , is to Sine AD ; so is Sine DAE , to Sine DE , which will be 18 d. 41 m.

Case II. Plate II. Triang. II.

Two sides and one Angle opposed to one of them being given, to find the other opposed Angle.

This is but the Converse to the last Case, and is as follows.

As the Sine of the side opposite to the given Angle,

To the Sine of the given Angle;

So is the Sine of the other given side,

To the Sine of the Angle required.

B

Case

Case III. Plate II. Triang. III.

Two sides together less than a Semi-circle with the Angle comprehended given, to find the other Angles.

They may be found at two Operations by a Proportion, demonstrated in the Trigonometry of the Learned Mr. Oughbree; or more concisely, in Mr. Jones's Introduction to the Mathematicks.

As the Sine of half the Sum of the sides,
To the Co-tangent of half the contained Angle;
So the Sine of half the difference of the sides,
To the Tangent of half the difference of the Angles.

Again,

As the Co-sine of half the Sum of the sides,
To the Co-tangent of half the contained Angle,
So the Co-sine of half the difference of the sides,
To the Tangent of half the Sum of the Angles.

Add the half difference to the half Sum, and you have the greater Angle; but subtract it, and there remains the lesser Angle.

Example. In the Triangle ADE , there is given,
 DAE 37 d. 03 m. $\left\{ \begin{array}{l} ADE \\ \text{and} \\ AED \end{array} \right\}$ required.
 AE 69 47
 AD 46 53

The Operation.

AE 69 d. 47 m.
 AD 46 53

Sum 116 40 half Sum 58 d. 20 m.
Differ. 22 54 half Diff. 11 27
 DAE 37 3 half thereof is 18 31

Co. Ar.

As S. half Sum sides AE and AD 58 d. 20 m. Log. 0.9700109
To S. half Diff. sides AE and AD 11 27 ——— 9.2977883
So is T.C. half DAE ——— 18 31 ——— 10.4750605
To Tan. half Diff. Ang. D and E 34 51 ——— 19.8428597

C.

	Co.	Ar.
As S.C. half Sum sides AE and AD 59d. 20m.	—	0.2798601
To S.C. half Diff. sides AE and AD 11 27	—	9.9912696
So is T. C. half DAE	18 31	10.4750605
To Tang. half Sum Angles D and E 79 49		10.7461902
half Sum Angles D and E 79 49		
half Diff. Angles D and E 34 51		
Sum 114 40	ADE	} required.
Rem. 44 58	AED	

Note, If the Sum of the two containing sides exceed a Semi-circle, then subtract each side severally from 180 d. and proceed with those Complements, as with the sides given in this Example foregoing; the Operation produces the Complement of the Angles sought to a Semi-circle.

Case IV. Plate II. Triang. IV.

Two Angles together less than a Semi-circle, with the side between them, to find the other sides.

'Tis performed at two Operations.

As the Sine of the half Sum of the Angles,
To the Sine of half their Difference;
So is the Tangent of half the interjacent side,
To the Tangent of half the Difference of the other sides.

Again, As the Co-sine of half Sum of the angles,
To the Tangent of half the interjacent side;
So the Co-sine of half their Difference,
To the Tangent of the half Sum of the other sides.

If half the difference of the sides be added to half the sum of the sides, it makes the greater side; but subtracted from it, leaves the lesser.

Note, If the Sum of the given angles exceed a Semi-circle, subtract each angle from a Semi-circle, and proceed with the Residues, the Operation will produce each sides complement to 180 deg.

Oblique Spherical Triangles.

Case V. Plate II. Triang. V.

Two sides with an Angle opposite to one of them being given,
to find the third side; the kind of the Angle opposite to the
other side being foreknown.

Example. In the Triangle ADE , there is given AD 46
deg. 53 min. DE 38 deg. 28 min. AED 45 deg. to find the
side AE .

First, find the angle opposite to the other side, by the
second Case; and then you have two sides and their op-
posite Angles. Then find the third side by the following
Proportion.

As the Sine of half the difference of the angles given,
To Tangent of half the difference of the sides given;
So the Sine of half the Sum of those angles,
To the Tangent of half the side required.

The Operation.

Co. Ar.

As Sine AD 46 d. 53 m.	Log. 0.1366089
To Sine AED 45 00	9.8494850
So is Sine DE 38 28	9.7938317
To Sine DAE 37 03	9.7800156

ADE 45 00

DAE 37 03

Sum 82 03 half Sum 41 d. 01 m.

Diff. 07 57 half diff. 03 58

AD 46 53

DE 38 28

diff. 08 25 half diff. 4 d. 12 m.

Co. Ar.

As Sine half diff. ang. A and E 03 d. 58 m.	L. 1.1600439
To Sine half Sum ang. A and E 41 01	9.8170882
So Tang. half dif. sides AD & DE 04 12	8.8659059
To Tang. half AE required 34 52	9.8430379
Doubled, is 69 44	AE required.

Cal

Case VI. Plate II. Triang. VI.

Two sides with an Angle opposite to one of them being given, to find the Angle included, or between them, the species of the Angle opposite to the other side being foreknown.

First, find the angle opposite to the other side by the second Case, and then we have two angles and their opposite sides, to find the other angle by the Proportion following.

As the Sine of half the difference of the sides,
To the Tangent of half the difference of the angles;
So is the Sine of half the Sum of the sides,
To the Co-tangent of half the angle required; that is,
to the Tangent of an Ark, whose Complement is half the angle required.

Case VII. Plate II. Triang. VII.

Two Angles with a side opposite to one of them being given, to find the third Angle, the kind of the side opposite to the other Angle being foreknown.

First, find the side opposite to the other angle by the first Case, and then we have two angles and their opposite sides, to find the third angle, by the following Proportion.

As the Co-sine of half the difference of the sides,
To the Tangent of half the Sum of the Angles;
So the Co-sine of half the Sum of the sides,
To the Co-tangent of half the contained angle.

Or thus: As the Sine of half the difference of the sides,
To the Sine of half their Sum;
So is the Tangent of half the difference of the angles,
To the Tangent Compl. of half the contained angle.

Case VIII. Plate II. Triang. VIII.

Two Angles with a side opposite to one of them being given, to find the interjacent side, the kind of the side opposite to the other angle being foreknown.

First, find the side opposite to the other angle by the first Case, and then you have two sides, and their opposite angles given, to find the third side by the Proportion following.

As the Co-sine of half the difference of the two angles,
To the Tangent of half the sum of the two sides;

Of Oblique Spherical Triangles.

So the Co-fine of half the Sum of the two given angles,
To the Tangent of half the third side.

Or thus: As the Sine of half the differ. of the two angles,
To the Sine of half their Sum;
So is the Tangent of half the differ. of the two sides,
To the Tangent of half the third side.

Case IX. Plate II. Triang. X.

Two sides and their contained Angle being given, to find the
third side.

Example. In the Triangle ADE there is given

$$\begin{array}{rcl} ADE & 137 \text{ d.} & 55 \text{ m.} \\ AD & 81 & 50 \\ DE & 38 & 28 \end{array} \left. \vphantom{\begin{array}{rcl} ADE & 137 \text{ d.} & 55 \text{ m.} \\ AD & 81 & 50 \\ DE & 38 & 28 \end{array}} \right\} AE \text{ required.}$$

The Resolution of this and the following Case is deduced from the Lord *Napiers* Catholick Proposition, (the Oblique Triangle, by a supposed Perpendicular, being reduced into two Rectangulars) by Mr. *Collins* in his Sector on a Quadrant.

The Operation.

As Radius	—————	Log. 10.0000000
To Si. Co. ADE the contained Ang. 42 d. 05 m.	9.8705039	
So is Tang. DE the lesser side — 38 28	9.9000865	
To Tang. of a fourth Arch — 30 31	9.7705904	

If the contained Angle be less than 90 deg. subtract the fourth from the greater side; but if it be greater than 90 d. from its Complement to 180 d. the Remainder is the Residual Arch.

Then say,

Com. Arith.

As S.C. of the fourth Arch — 30 d. 31 m.	Log. 0.0647541
To S. C. of the Residual — 67 39	9.5800845
So is S.C. of the lesser side — 38 28	9.8927452
To S.C. the side required AE — 69 47	9.5385838

So that the side AE is 110 d. 13 m. For if the contain'd Angle and Residual Arch, are each greater, or less than 90 d. the side sought is less than 90 d. But when one is greater, and the other less, (as in this Instance) the side sought is greater than 90 d. And the Sine of 69 d. 47 m. is also the Sine of its Supplement 110 d. 13 m. Therefore the side AE , is 110 d. 13 m.

Case

Of Oblique Spherical Triangles.

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Case X. Plate II. Triang. X.

Two Angles, and the interjacent side being given, to find the third Angle.

Example. In the Triangle ADE, there is given

$$\begin{array}{l} \text{ADE } 114^{\circ} 39' \\ \text{DAE } 37^{\circ} 03' \\ \text{AD } 46^{\circ} 53' \end{array} \left. \vphantom{\begin{array}{l} \text{ADE } 114^{\circ} 39' \\ \text{DAE } 37^{\circ} 03' \\ \text{AD } 46^{\circ} 53' \end{array}} \right\} \text{AED required.}$$

The Operation.

As Radius ————— Log. 10.00000

To S.C. AD the interjacent side 46 d. 53 m. — 9.8347297

So is Tang. DAE the lesser Angle 37 03 — 9.8779027

To Tang. of the fourth Arch — 27 17 — 9.7126324

If the interjacent side be more than a Quadrant, subtract the fourth Arch from the greater Angle, if less, from the said Angles Complement to 180 d. the Remainder is the residual Arch.

Com. Arch,

As S. C. of the fourth Arch — 27 d. 17 m. Log. 0.0512201

To S. C. of the residual Arch — 38 04 — 9.8961369

So is S. C. DAE the lesser Angle 37 03 — 9.9020628

To S. C. AED the angle required 45 01 — 9.8494198

So that the required Angle AED, is 45 d. 01 m.

In this and the foregoing Case, the Affection of the required side or angle, may be determined by the residual Arch.

For if the contained Angle, or interjacent side, be less than a Quadrant, and the residual Arch more, or when the contained Angle, or interjacent side is greater than a Quadrant, and the residual Arch less; the side or angle required, is greater than 90 d. in all other Cases less.

Case XI. Plate II. Triang. XI.

Three sides given, to find an Angle.

Example. In the Triangle ADE, there is given

$$\begin{array}{l} \text{AE } 110^{\circ} 13' \\ \text{AD } 81^{\circ} 50' \\ \text{DE } 38^{\circ} 28' \end{array} \left. \vphantom{\begin{array}{l} \text{AE } 110^{\circ} 13' \\ \text{AD } 81^{\circ} 50' \\ \text{DE } 38^{\circ} 28' \end{array}} \right\} \text{ADE required.}$$

B 4

For

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For the Resolution of this Case, take this Direction.

Add the three sides together, and from their half Sum, subtract the side opposite to the Angle required.

Then to the Arithmetical Complements, of the Log. Sines of the containing sides; add the Log. Sines of the half Sum and Remainder: Half the total of these four Logarithms, is the Sine Compl. of half the Angle required.

The Operation.

AD 81d. 50 m.	} The contain- ing sides. }	S. Co. Ar. 0.0044266
DE 38 28		S. Co. Ar. 0.2061683
AE 110 13	} half sum 115d. 15m.	S. ——— 9.9563870
Sum 230 31		Rem. 05 02 S. ——— 8.9431743
Sum 115 15		Sum 19.1101562
Rem. 05 02	S. C. 68 58	half Sum 9.5550781

Which being doubled, produces ADE 137 deg. 56 m. required.

Case XII. Plate II. Triang. XII.

Three Angles given, to find a side.

Example. In the Triangle ADE, there is given.

ADE 137d. 55 m.	} DE required.
AED 45 00	
DAE 26 23	

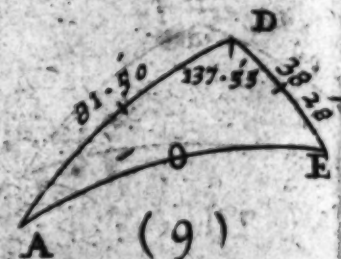
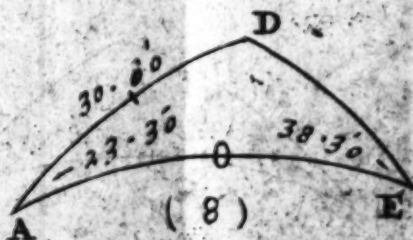
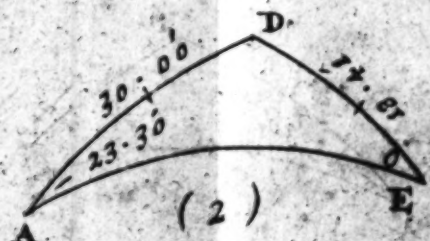
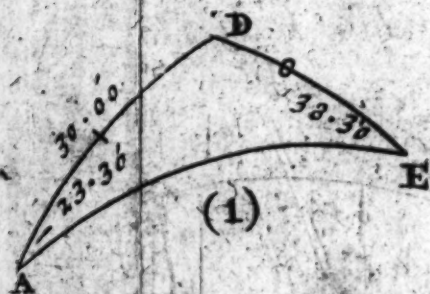
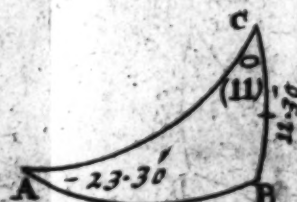
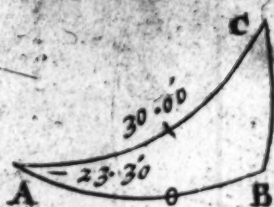
This Case is likewise perform'd by the direction in the eleventh Case, the Angles being converted into sides, and the sides into Angles, by taking the Complement of the greatest Angle to a Semi-circle.

Com. ADE 42 d. 05 m.	} The adjacent Angles. }	S. Co. Ar. 0.1737886
AED 45 00		S. Co. Ar. 0.1505150
DAE 26 23	} half sum 56d. 44m.	S. ——— 9.9222721
Sum 113 28		Rem. 30 21 S. ——— 9.7035329
half sum 56 44		Sum 19.9501086
Rem. 30 21	S. C. 19 14	half Sum 9.9750543

Which being doubled, gives DE 38 deg. 28 min. required.

Thus

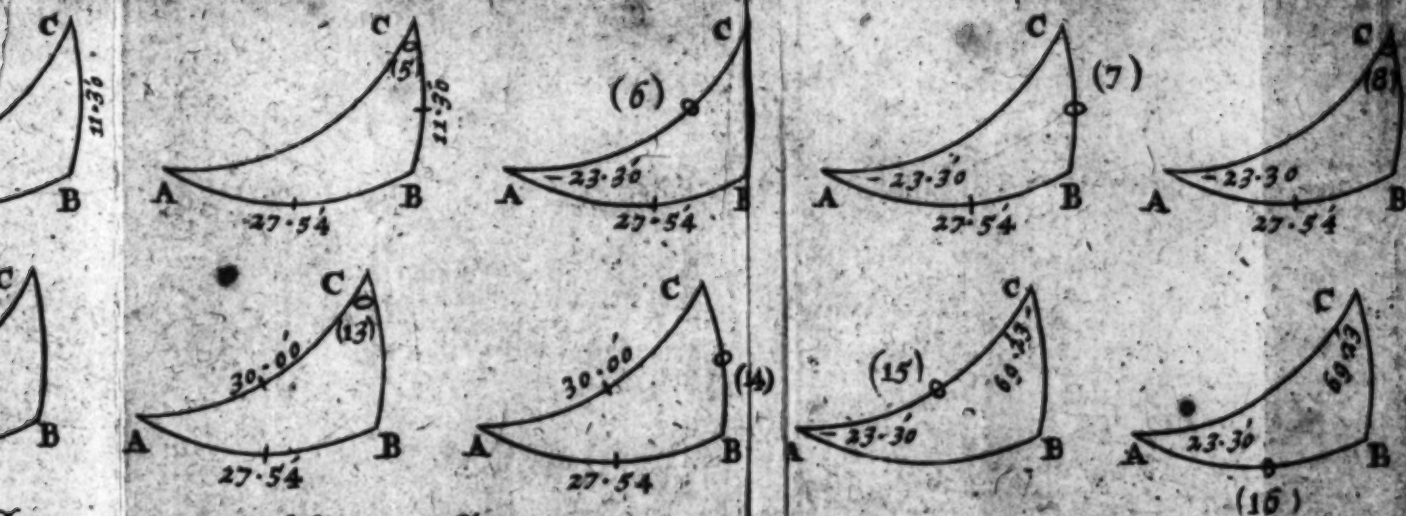
Plate II



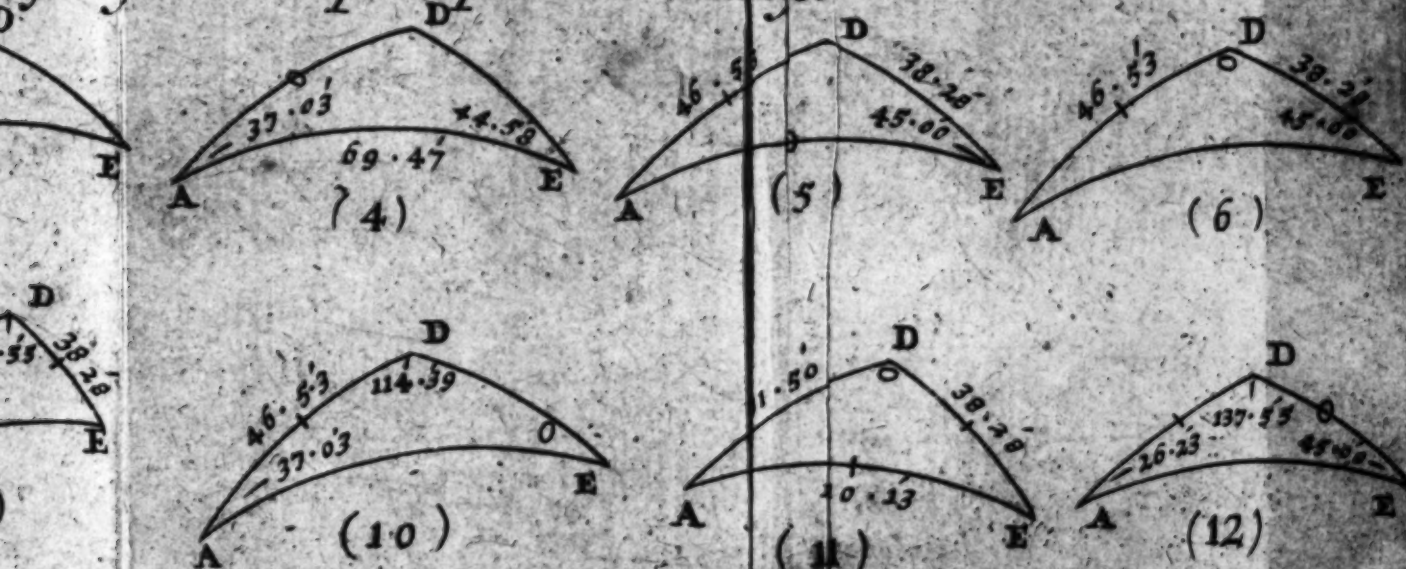
The 16 Cases of a Right

The Twelve Cases of

Right Angled Spherical Triangle



Cases of an Oblique Spherical Triangle



Thus much for *Trigonometry*, both *Plain*, and *Spherical*; the Application to Navigation followeth next, and first of *Plain Sailing*.

CHAP. IV.

Containing Problems of Sailing by the Plain Sea Chart, commonly called Plain Sailing.

Navigation is commonly distinguish'd into three sorts, Plain Sailing, *Mercator's Sailing*, and *Circular Sailing*, or Sailing by the Arch of a great Circle.

Plain Sailing, or sailing by the Plain Chart, is the plainest, and the Foundation of all the rest, and near the Equinoctial there is no need of any other to be used, because there the Degrees of Longitude, as well as the degrees of Latitude, are all equal; each degree being divided into 60 Minutes or Miles, tho they are somewhat more than *English Miles*, each Minute or Mile containing about 6000 feet.

In this Art the Sea-man hath these helps.

First, he hath his Compass to direct him which way he sails; which is divided first into four Cardinal Points, or Quarters, East, West, North, South, and each of these Quarters are divided into 8 equal Parts, commonly called Rumbs, making in all 32 Points: So that Steering by the Compass, well made and duly rectified, the Sea-man always knows which way he sails, to a small matter.

The second help the Seaman hath in keeping his Account is a careful Observation (by the Log-line or some other good way) how many Miles or Leagues he sails every hour, and so every Watch, and every day.

The third help, is the knowing and observation of the Latitude, both of the place from whence he sails, and where he is arrived, or whither he is to sail.

And out of these three things, by the doctrine of plain Triangles, he comes to know all that is necessary for the keeping of his Account; so that he may know at any time where he is, how far he hath sailed, and how far he is yet to sail, and which way, or upon what Point of the

the Compass he is to steer, and all this by these few Rules of Rectangular Triangles.

Prob. I. Plate I. Triang. I.

The Course and Distance given, to find the difference of Latitude, and the Departure.

Example. A Ship sailing N.E. by N. 372 minutes, I demand her difference of Latitude and Departure,

In the Triangle ABC.

AC represents the distance sailed.

AB the differ. Latitude.

BC the departure.

BAC the Angle of the Course from the Meridian.

ACB the Complement of the Course.

The Operation.

For the difference of Latitude. Plate I. Triang. I.

As Radius ————— Log. 10.0000000

To the distance sailed 372 m. ————— 2.5705429

So is Sine Compl. of the Course 33 d. 45 m. ————— 9.9198464

To the diff. Latitude 309 min. three tenths AB ————— 2.4903893

For the Departure.

As Radius ————— Log. 10.0000000

To the distance sailed 372 min. ————— 2.5705429

So is S. Course 33 deg. 45 min. ————— 9.7447390

To the Departure 206 m. seven tenths BC ————— 2.3152819

Prob. II. Plate I. Triang. II.

The Course and Difference of Latitude being given, to find the Distance and the Departure.

Example. A Ship sailing N.W. by N. until her difference of Latitude be 309 Minutes, I demand her Distance and Departure.

The Operation. For the distance.

As S.C. of the Course, 33 d. 45 m. ————— Log. 9.9198464

To the differ. Latitude 309 m. ————— 2.4899585

So is Radius ————— 10.0000000

To the distance sailed 371 m. six tenths AC ————— 2.5701121

For

Of Plain Sailing.

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For the Departure. Plate I. Triang. II.

Co. Ar.

As Sine Compl. of the Course 33 d. 45 m. — Log. 0.0801536
 To the diff. Latitude 309 min. ————— 2.4899585
 So is Sine Course 33 d. 45 m. ————— 9.7447390
 To the Departure 206 m. four tenths BC ——— 2.3148511

Prob. III. Plate I. Triang. III.

The Course and Departure given, to find the Distance and Difference of Latitude.

Example. A Ship sailing South East by South, until her departure be 206 minutes, I demand the distance and difference of Latitude.

The Operation. For the distance.

As S. Course — 33 d. 45 m. ————— Log. 9.7447390
 To the Departure BC 206 m. ————— 2.3138672
 So is Radius ————— 10.0000000
 To the distance ————— 370 m. seven tenths AC — 2.5691282
 For the difference of Latitude. Plate I. Triang. III.

Co. Ar.

As S. Course — 33 d. 45 m. ————— Log. 0.2552610
 To the departure BC — 206 ————— 2.3138672
 So S. C. Course — 33 ————— 45 ACB ————— 9.9198464
 To diff. Latit. AB ————— 309¹/₁₀ m. ————— 2.4889746

Prob. IV. Plate I. Triang. IV.

The difference of Latitude and Distance given, to find the Course and Departure.

Example. A Ship sails between the North and the East 372 min. until her difference of Latitude be 309 min. I demand her Course and Departure.

The Operation. For the Course.

As the distance sailed 372 min. AC ————— Log. 2.5705420
 To Radius ————— 10.0000000
 So is the diff. Lat. 309 m. AB ————— 2.4899585
 To the S.C. Course 33 d. 50 m. ————— 9.9194156
 For

Of Plain Sailing.

For the Departure.

As Radius	Log. 10.0000000
To the distance 372 min.	2.5705429
So is the Sine Course 33 d. 50 min.	9.7456828
To the Departure 207 m. $\frac{1}{4}$ BC	12.3162257

Prob. V. Plate I. Triang. V.

The Distance and Departure given, to find the Course and Difference of Latitude.

Example. A Ship sails between the South and the West 372 min. until her Departure be 206 min. I demand the Course and Difference of Latitude.

The Operation.

For the Course. Plate I. Triang V.

As the distance 372 min. AC	Log. 2.5705429
To Radius	10.0000000
So is the departure 206 min. BC	2.3138672
To the Sine Course 33 deg. 37 min. BAC	9.7433243

For the difference of Latitude.

As Radius	Log. 10.0000000
To the distance 372 min. AC	2.5705429
So is S.C. 33 deg. 37 min. ACB	9.9205200
To the diff. Latitude 309 min. $\frac{1}{4}$ AB	12.4210629

Prob. VI. Plate I. Triang VI.

The Difference of Latitude and Departure given, to find the Course and Distance.

Example. A Ship sailing between the South and the West, until her difference of Latitude be 309 min. and her departure 206 min. I demand the Course and distance.

The Operation. For the Course.

As the diff. Lat. 309 min. AB	Log. 2.4899585
To Radius	10.0000000
So is departure 206 min. BC	2.3138672
To T. Course 33 d. 41 m. BAC	9.8239087

For

For the Distance. Plate I. Triangl. VI.

As S. Course ——— 33 d. 41 m. ——— Log. 9.7439817

To the Departure ——— 206 BC ——— 2.3138672

So is Radius ——— 10.0000000

To the Distance AC ——— 371 1/2 m ——— 2.5698855

These are the 6 Cases of Plain Sailing; and for the Learners ease, they are Collected together; with their most usual Canons or Proportions for each Case, and are as followeth.

The 6 Cases of Plain Sailing, with the usual Canons to each Case.

Case 1. Course and Distance Run given; to find the difference of Latitude, and Departure from the Meridian.

As the Radius,	As the Radius,
Is to the Distance run,	Is to the Distance run;
So is the S. Comp. of the Course,	So is the S. of the Course,
To the difference of Latitude	To the Dep. from the Merid.

Case 2. Course and Difference of Latitude given; to find the Distance run, and the Departure from the Merid.

As the S. Comp. of the Course,	As the S. Comp. of the Course,
Is to the difference of Lat.	Is to the difference of Lat.
So is the Radius,	So is the Sine of the Course,
To the distance run,	To the Dep. from the Merid.

Case 3. Course and Departure from the Meridian given, to find the distance run, and the difference of Latitude.

As the Sine of the Course,	As the Sine of the Course,
Is to the Dep. from the Merid.	Is to the Dep. from the Merid.
So is the Radius,	So is the S. Comp. of the Course.
To the distance run,	To the difference of Latitude.

Case 4. The distance run, and the difference of Lat. given; to find the Course, and departure from the Meridian.

As the distance run,	As the Radius,
Is to the Radius:	Is to the distance run:
So is the difference of Latitude.	So is the S. of the Course.
To the S. Comp. of the Course.	To the Dep. from the Merid.

Case 5.

Case 5. The distance run, and the departure from the Meridian given; to find the Course, and the difference of Latitude.

As the Radius,

Is to the distance run:

So is the Dep. from the Merid.

To the Sine of the Course.

As the Radius,

Is to the distance run:

So is the S. Comp. of the Course,

To the difference of Latitude.

Case 6. The difference of Latitude, and the departure from the Meridian given; to find the Course, and the distance run.

As the difference of Latitude,

Is to the Radius:

So is the Dep. from the Merid.

To the Tangent of the Course.

As the Sine of the Course,

Is to the Dep. from the Merid.

So is the Radius,

To the distance run,

Prob. VII. Plate III. Figure I.

To find how many Minutes or Miles, or Leagues, sailed on any Romb or Point of the Compass, will raise, or lay the Pole a Degree, and also how much the Departure from the Meridian then is.

Note, To raise or lay the Pole a Degree, is as much as to say, Alter the Latitude a Degree, or the Difference of Latitude is one Degree.

Example. The Difference of Latitude being 1 deg. or 60 min. what is the distance run, and the departure from the Meridian, for each Point of the Compass.

In the Plate III, Figure I, are 7 Right-Angle Triangles, whereof the Leg A B the difference of Latitude 60 min. is common to them all.

And the Hypotemuses, A 1, A 2, A 3, A 4, A 5, A 6, and 7, are the several distances run on each Romb from the Meridian.

In like manner, the Legs B 1, B 2, B 3, B 4, B 5, B 6, and B 7, are the several departures from the Meridian, for those Rombs.

Which distances and departures, are found by the 2d Case of Plain Sailing: Thus for the distance run A 1.

As

Of Plain Sailing.

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As the S. C. Course ——— 11 d. 15 m. co. ar. 0.0084261
 Is to the difference Latitude AB 60 minutes ——— 1.7781512
 So is Radius ——— 10.0000000
 To the distance run A 1 min. 61. 17 parts ——— $\times 1.7865773$

For the departure B 1.

As the S. C. Course, ——— 11 d. 15 m. co. ar. 0.0084261
 Is to the difference Latitude AB—60 minutes— 1.7781512
 So is S. Course, S. of BA 1 ——— 11 d. 15 m ——— 9.2902257
 To the departure B 1 — minutes 11. 93 parts — $\times 1.0768130$

In like manner, may be found all the distances, and departures for each Romb, as in the Table following.

A TABLE shewing the Distance run, and the Departure from the Meridian, for every Romb, when the difference of Latitude is one degree, or 60 minutes or miles : Also the Distance run, and difference of Latitude, when the Departure is 1 deg. or 60 min.

Rombs.		Distance Run	Departure	Rombs.	
North.	South.	m.	m.	North.	South.
N. by E.	S. by E.	61.2	11.9	N. by W.	S. by W.
N. N. E.	S. S. E.	64.9	24.8	N. N. W.	S. S. W.
N. E. by N.	S. E. by S.	72.2	40.1	N. W. b. N.	S. W. by S.
N. E.	S. E.	84.8	60.0	N. W.	S. W.
N. E. by E.	S. E. by E.	108.0	89.8	N. W. b. W.	S. W. b. W.
E. N. E.	E. S. E.	156.8	144.9	W. N. W.	W. S. W.
E. by N.	E. by S.	307.6	301.6	W. by N.	W. by S.
East	East	Infinite	Infinite	West.	West.

By this Table, if the Course be N. by E. S. by E. N. by W. or S. by W. and the difference Latitude 60 minutes ; then the distance run is minutes 61.2 tenths, and the departure from the Meridian, is minutes 11.9 tenths : And the course being N.N.E. or S.S.E. or N.N.W. or S.S.W. the distance is minutes 64.9 tenths, and the departure is minutes

minutes 24.8 tenths: Also the Course N.E. by N. 62° , the distance is minutes 72.2 tenths, and departure minutes 40.1 tenth, when the difference Latitude is 60 minutes.

This Table serves to find the distance and difference of Latitude, when the departure is 60 minutes, if the 2 middle Columns be turned upside down; thus, the Course being E. by N. or E. by S. or W. by N. or W. by S. and the departure 60 minutes; then the distance is minutes 61.2 tenths, and the difference of Latitude, is minutes 11.9 tenths; and so for any other Course.

The farther use of the foregoing Table, in finding the difference of Latitude, and Departure from the Meridian, either in degrees or minutes; for any Course and Distance, is by this Rule.

As the distance in the Table, against the given Course, is to one degree, or 60 minutes:

So is the given distance run, to the required difference of Latitude in degrees or minutes.

And, As the distance in the Table, is to the departure in the Table:

So is the given distance run, to the required departure from the Meridian.

Example 1. If a Ship runs 496 min. S.W. by W. from the Lizard in 50 d. 10 m. North Latitude: I demand the Lat. she is in, and how far she is departed from the Merid. In the Table against S.W. by W. the distance is 108, and the departure 89.8. Therefore by the Rule above it, thus. As 108, is to 60; so is 496, to the diff of Latitude.

$$\begin{array}{r} \text{Wd } 108 \cdot \text{Wd } 108 \cdot 160 \\ \text{Wd } 108 \cdot 160 \\ \hline 29760 \\ 81360 \end{array}$$

108) 29760 275 $\frac{1}{2}$ or near 275.5 minutes, for the difference of Latitude.

21660

754

Then

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Then again to find the departure from the Meridian as followeth,

As 108 to 89.8, so is 496 to the departure.

89.8

3968

4464

3968

44540.8

(0

2A(1

2384(6

08) 44540.8 (412.4 or minutes 412.4 tenths, the departure.

432862

1013

24

Then to find the Latitude the Ship is in, reduce the difference of Latitude 275 minutes into degrees, by dividing it by 60, and it's 4 d, 35 m. which being subtracted from the Latitude of the *Lizard* 50 d, 10 m. the remainder is 45 d. 35 m. the Latitude the Ship is in North; And the Departure 412 minutes, divided by 60, the Quotient is 6 d. 52 m. the Ships Meridional distance West.

Or if you will, you may by this Table, find both difference of Latitude, and Meridional distance in degrees, and Decimal Parts of a Degree, by two Proportions in the Rule of Three. Thus,

As the distance in the Table against the Course, is to 1 d.

So is the distance given, to the degrees of difference of Latitude. And,

As the distance in the Table against the Complement of the Course, is to 1 degree:

So is the distance given, to the degrees of Meridional distance.

Example 2. Suppose a Ship runneth 496 minutes S. W. by S. I demand her difference of Latitude, and Meridional distance in Degrees?

C

In

Of Plain Sailing.

In the Table against the Course S. W. by S. the distance is 72.2 ; and against the Complement of the Course S. W. by W. is the distance 108. Therefore,

As 72.2 is to 1 ; so is 496 to the difference of Latitude.

$$\begin{array}{r}
 (7 \\
 88(0 \\
 82848 \\
 72.2 \) 496000 \ (6.86 ; \text{ that is, } 6 \text{ d. } 86 \text{ parts of} \\
 \quad \quad \quad \dots \quad \quad \quad 100, \text{ or } 6 \text{ d. } 52 \text{ m. for the diff.} \\
 \hline
 433262 \quad \quad \quad \text{of Latitude southerly.}
 \end{array}$$

And again,

As 108 is to 1 ; so is 496 to the Meridional distance.

$$\begin{array}{r}
 (0 \\
 10(2 \\
 848(8 \\
 108 \) 49600 \ (4.59 ; \text{ that is } 4 \text{ d. } 59 \text{ parts of} \\
 \quad \quad \quad \dots \quad \quad \quad 100, \text{ or } 4 \text{ d. } 35 \text{ m. for the} \\
 \hline
 43202 \quad \quad \quad \text{meridional distance westerly.} \\
 547 \\
 9
 \end{array}$$

Thus may you do for any other Point of the Compass, and if the Table be made for each quarter of a Point, which may be done by the 2d Case of Plain Sailing, and the Rule before the Table ; then may the difference of Latitude and meridional distance be found for every quarter of a Rumb, and so be of good use in Plain Sailing, when other Tables and Instruments are wanting, to them that understand something of Arithmetick ; for whose sake I add another Table, and the manner of making it ; whereby any single Course, or a Traverse may be wrought, to a quarter of a Point of the Compass, and for any distance run ; as shall be shew'd after the Table is made.

The making a Table of difference of Latitude, and departure from the Meridian, for each quarter of a Rumb or Point of the Compass.

Such a Table is made by the *First Case of Plain Sailing* in this manner.

For the difference of Latitude.

As the Radius ————— 10.000000

Is to the distance run ——— 1 minute — 0.000000

So is the S.C. of the Course, S. of 87 d. 11 m. — 9.9994750

To the difference of Latit. m. 0.9988 parts 9.9994750

For the departure from the meridian.

As the Radius ————— 10.000000

Is to the distance run ——— 1 m. — 0.000000

So is the S. Course, Sine of — 2 d. 49 m. — 8.6914379

To the departure — min. 0.04914 parts — 8.6914379

So that for the first quarter of a Rumb or Point from the Meridian, when the distance is 1 min. the difference of Latitude is Min. 0.9988 parts of 10000; and the departure from the Meridian is Min. 0.04914 parts of 10000; or more short, Minutes 1.00, and Minutes 0.05 : In like manner may be done for all the other quarters of each Rumb, and being done, will be as in the Table following.

The use of the Table following.

The Points being in the left hand Column, the difference of Latitude and Departure stands at the head or top of the Table; but when the Course or Point of the Compass is in the right hand Column, the difference of Latitude and departure stands at the foot of the Table. As for Example; If the Course be 1 Point, the difference of Latitude is 0.98 parts of 100, and the departure is 0.20 parts of a 100; but if the Course be 7 Points, then the difference of Latitude is 0.20, and the departure is 0.98 parts of 100, when the distance is 1 Mile, M. League or D. And when the distance is more than 1, multiply it by the Number in the Table,

ble, (cutting off 2 Figures to the right hand (which are decimal Parts) the Product is either the difference of Latitude, or departure from the Meridian for the said distance given.

A Table of difference of Latitude, and Departure when the distance is 1.

Po ints.	Lat.	Dep.	Points.
$\frac{1}{4}$	1.00	0.05	$\frac{3}{4}$
$\frac{1}{2}$	1.00	0.10	$\frac{1}{2}$
$\frac{3}{4}$	0.99	0.15	$\frac{1}{4}$
1 Point	0.98	0.20	$\frac{1}{4}$
$\frac{1}{4}$	0.97	0.24	$\frac{3}{4}$
$\frac{1}{2}$	0.96	0.29	$\frac{1}{2}$
$\frac{3}{4}$	0.94	0.34	$\frac{1}{4}$
2 Point	0.92	0.38	$\frac{1}{4}$
$\frac{1}{4}$	0.90	0.43	$\frac{3}{4}$
$\frac{1}{2}$	0.88	0.47	$\frac{1}{2}$
$\frac{3}{4}$	0.86	0.51	$\frac{1}{4}$
3 Point	0.83	0.56	$\frac{1}{4}$
$\frac{1}{4}$	0.80	0.60	$\frac{3}{4}$
$\frac{1}{2}$	0.77	0.63	$\frac{1}{2}$
$\frac{3}{4}$	0.74	0.67	$\frac{1}{4}$
4 Point	0.71	0.71	$\frac{1}{4}$
Points.	Dep.	Lat.	Points.

Then the distance ——— 12.5 The distance ——— 12.5
 Multiplied by ——— 0.90 Multiplied by ——— 0.90
 The diff. Lat. is ——— 112.50

The Departure is ——— 53.75

So that the Difference of Latitude is 112 miles, minutes, leagues, or degrees, and 50 parts of 100; and the departure from the Meridian 53 miles, minutes, leagues, or degrees, and 75 parts of 100.

Not

Note always, That the distance, difference of Latitude, and the departure from the Meridian, (in the use of this Table) are of one kind or denomination.

The next thing in Plain Sailing, is to resolve a Traverse, which I will shew how its done by this last Table, and by the Logarithms.

Prob. VIII. Plate III. Figure II.

A Ship being bound to a certain Port, meeting with contrary Winds, Sails first S.E. by S. 67 min. then S.E. by E. 53; then W.S.W. 45; then N. E. by N. 74; then W. 57; and then S. by E. 83 minutes: I demand the difference of Latitude, Departure, and direct Course and Distance from the first Place departed?

The manner of resolving a Traverse is thus; first set down the several Courses and Distances, with the number of Points each Course is distant from the Meridian, &c. as in the Table following,

2. By the last Table, find the difference of Latitude and Departure for each Course and Distance severally; which place in their proper Columns thus. If the Course be South Easterly, put the difference of Latitude in the South Column, under [South;] and the departure in the East Column, under [East:] If South Westerly, in the South and West Columns; If North Easterly, in the North and East Columns; and if North Westerly, then in the North and West Columns.

As for Example: The first Course is S. E. by S. that is 3 Points from the Meridian, and the distance Sailed is 67 minutes; now the numbers for 3 Points in the foregoing Table, are Lat. 0.83, and Dep. 0.56, which multiply by the given distance 67, produceth the difference of Latitude and Departure for the first Course: In like manner, proceed for each Course; as in the Work following.

Course 3 Points, Lat. is ——— 0.83 and Dep. ——— 0.56
Multiply by the distance ——— 67 ——— 67

5 81	3 92
49 8	33 6

Difference of Latitude ——— 55.61 S. and the depar. 37.52 E.
C 3 2 Course

2 Course 5 Points, Lat. is — 0.56 and Dep. — 0.83

Multiply by the distance — 53	53
1 58	2 49
28 0	41 5

Difference Latitude — 39.58 S. and Dep. — 41.99 E.

3 Course 6 Points, Lat. — 0.38 and Dep. — 0.92

Multiply by the distance — 45	45
1 90	4 60
15 2	36 8

Difference Latitude — 17.10 S. and Dep. — 41.40 W.

4 Course 3 Points, Lat. is — 0.83 and Dep. — 0.56

Multiply by the distance — 74	74
3 32	2 24
58 1	39 2

Difference Latitude — 61.42. N. and Dep. 41.44 E.

5 Course is W. distance 57, which is now the dep. 57 W.

6 Course 1 Point, Lat. is 0.98 and Dep. — 0.20

Multiply by distance — 83	83
2 94	60
78 4	1 60

Difference Latitude — 81.34 S. and dep. — 16.60 E.

Note, When the Course is E. W. N. or S. the distance you must place in the East, West, North or South Columns, as here the 5th Course being W. the distance 57 is placed in the West Column.

3. Having found the difference of Latitude and departure for each Course, and placed them in their proper Columns, add them up, and subtract the *North* and *South* Columns; that is, the least from the greatest; in like manner the *East* and *West* Columns.

As here the Sum of the *North* Column 61.4 subtracted from the Sum of the *South* Column 183.6, the Remainder 122.2 is the *Differ. of Lat. Southerly*: And the Sum of the *West* Column 98.4, being subtracted from the Sum of the *East* Columns 139.5, the Remainder 41.1 is the *Dep. Easterly*.

Number.	Courses.	Distance.	Points from the Meridian.	Difference Latit.		Departure.	
				North.	South.	East.	West.
1	S E. by S	67	3		55.6	37.5	
2	S. E. by E.	53	5		29.6	44.0	
3	W. S. W.	45	6		17.1	41.4	
4	N.E. by N.	74	3	61.4		41.4	
5	W.	57	8		81.3	16.6	57.9
6	S. by E.	83	1		81.3	16.6	98.4
Sum'd up				61.4	183.6	139.5	98.4
Subtract					61.4	98.4	
Difference of Latitude					122.2	41.1	Depart.

4. Then having the difference Latitude 122.2, and the departure 41.1; the Course and distance may be found by the 6th Case of Plain Sailing thus,

For the Course, the Operation is as followeth.

As the diff. Latitude 122.2 — co. ar. — 7.9129288
Is to the Radius ————— 10.0000000
So is the departure — 41.1 ————— 1.6138418

To the T. of the Course 18 d. 35 m. co. ar. — 79.5267706

And because the diff. Lat. is *Southerly*, and the departure is *Easterly*; therefore the Course is *South* 18 d. 35 m. *Easterly*, or S. by E. $\frac{1}{4}$ E almost.

For the distance, the Operation is as followeth.

As the S. of the Course 18 d. 35 m. — co. ar. — 0.4066403
Is to the departure — 41.1 ————— 1.6138418
So is the Radius ————— 10.0000000

To the distance — 119 ————— 121.1104821

So that this Traverse consisting of 6 Courses being resolved

solved into one Course, is S. by E. $\frac{1}{4}$ E. and the distance from the first place is 129 minutes, in like manner do for any Traverse: or you may find the difference of Latitude and Departure from the Meridian for each several Course by the first *Case of Plain Sailing*, which you must collect into a Table as before, and so proceeding the foregoing directions you'll resolve the Traverse, but with more Labour than in the way here used.

Thus much for a Traverse, the next in order is to shew Plain Sailing in an *Oblique Triangle*, vulgarly called *Oblique Sailing*, as distinct from Plain Sailing, and that by some conceited Pretenders, to (I can't term them Teachers of) the Mathematicks, but it's their vulgar Error. And altho' it's the least useful in Navigation, yet I shall not wholly pass it by, but add a few Problems to inform the Learners of what Use an *Oblique Triangle* may be in Plain Sailing.

Prob. IX. Plate III. Figure III.

Suppose two Ports lie North and South, and a Ship sails from the northermost S.E. 68 leagues; another from the southermost sails N.E. by N. till she meet the first Ship: I demand the distance of these Ports, and the second Ship's distance run?

In the Triangle BCD, Plate III. Figure III.

Let B represent the northermost } Port.

C the southermost ——— }

BD the first } Ship's Course and Distance.

CD the second }

D the place where the Ships meet.

Then 1. The Angle CBD is 4 Points or 45 d. because B D S.E. is 4 Points from BC south.

2. The Angle CBD is 3 Points or 33 d. 45 m. because CD N.E. by N. is 3 Points from CB north.

3. Then the Angle BDC is 9 Points or 101 d. 15 m. because the 3 Angles of every plain Triangle is 16 Points or 180 degrees.

4. The side BD is 68 leagues the first Ship's distance run: so that here is given all the Angles and one side, to find the other 2 sides, which by *Case I. of Oblique Triangles* is thus.

1. For

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1. For BC the distance of the 2 Ports, the Operation is.
As the Sine of the Angle BCD 33 d. 45 m. co. ar. 0.2552610
Is to the side BD ——— 68 Leagues ——— 1.8325089
So is the S. of the Angle BDC 101 d. 15 m. - 9.9915739
To the side BC ——— 120 Leagues - 12.0793438

Note, to find the Sine of 101 d. 15 min. - subtract it from 180 d. the Remainder is 78 d. 45 m. whose Sine is also the Sine of 101 d. 15 m.

2. For CD the second Ship's distance, the Operation is.
As the Sine of the Angle BCD 33 d. 45 m. co. ar. 0.2552610
Is to the side BD ——— 68 Leagues ——— 1.8325089
So is the Sine of the Angle CBD 45 d. 00 m. - 9.8494856
To the side CD ——— Leagues 86. 55 parts - 11.9372549

Prob. X. Plate III. Figure IV.

If two Ports lie N.E. and S.W. and a Ship sails from the southermost E.S.E. 45 Leagues, another from the northermost runs 72 Leagues southerly, and then meets the first: I demand the Course steer'd by the last, and distance of the Ports?

In the Triangle BCD, Plate III. Figure IV.
Let B represent the southermost } Port.
C the northermost }
BD the first } Ships Course and Distance.
CD the second }
D the place where the Ships meet.

Then 1. For as much BC, N.E. is 6 Points from BD E.S.E. therefore the Angle CBD is 6 Points or 67 d. 30 m.

2. The side BD 45 Leagues is the first Ship's distance sail'd, and the side CD 72 Leag. is the 2d Ship's distance.

3. Here is 2 Sides and an Angle opposite given, to find the other parts of the Triangle, which is perform'd by Case 2. of Oblique Triangles: Thus,

1. For BCD the 2d Ships Course from S. W. the Operation is,
As the side CD ——— 72 Leagues co. ar. - 8.1426675
Is to the Sine of the angle CBD 67 d. 30 m. - 9.9656153
So is the side BD ——— 45 Leagues ——— 1.6532125
To the Sine of the angle BCD 35 d. 16 m. -- 12.7614953

The

Of Plain Sailing.

The said Angle BCD 35° d. 16 m. being subtracted from S.W. or N.E. 45° d. the Remainder 9° d. 44 m. or S. $\frac{1}{4}$ W. is the Course of the last Ship from C to D.

2. For BC the distance of the 2 Ports, the operation is,
 As the Sign of the Angle CBD 67° d. 30 m. co. ar. 0.0343847
 Is to the side CD ————— 72 leagues ————— 1.8573325
 So is the Sine of the angle BDC 77° d. 14 m. ————— 9.9891285
 To the side BC ————— 76 leagues ————— 11.8808457

So that the distance of the Ports BC is 76 leagues.

Prob. XI. Plate III. Figure V.

Suppose a Ship Sails S.S.W. 50 leagues, and then E.S.E. $\frac{1}{2}$ E. 35 leagues: I demand her Course and distance from the first place of Departure?

In the Triangle BCD, Plate III. Figure V.

Let B represent the Place departed from.

BC the first Course and Distance, S.S.W. 50 leagues.

CD the second Course and Distance, E.S.E. $\frac{1}{2}$ E. 35 leagues.

BD the Course and Distance from the first place of her departing.

Then 1. for as much as C B, N. N. E. is $7\frac{1}{2}$ Points from CD, E.S.E. $\frac{1}{2}$ E. therefore the Angle BCD is $7\frac{1}{2}$ Points or 84° d. 23 m. And,

2. BC being 50 leagues, also CD 35 leagues, here is 2 sides and their contained Angle given, to find the other parts of the Triangle, which may be found by Case III. of Oblique Triangles, as followeth.

1. For the Angle CBD the Ship's Course from S.S.W. the Operation is thus.

Side BC ——— 50. From the 3 Angles ——— 180° 00'

Side CD ——— 35. Subtract the Angle BCD ——— 84° 23'

Sum of BC & CD 85. Rest. sum of Ang. CBD & BDC ——— 95° 37'

Diff. of BC & CD 15. The $\frac{1}{2}$ sum of Ang. CBD & BDC 47° 48'

As

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As the Sum of BC and CD ———— 85 co. ar. 8.0705811
 Is to the diff. of BC and CD ———— 15 ———— 1.1760913
 So is the Tang. of $\frac{1}{2}$ sum of CBD & BDC $47^{\circ} 48'$ — 10.0425150
 To the Tang. of $\frac{1}{2}$ diff. of CBD & BDC $11^{\circ} 01'$ — 19.2891874
 Subtracted is the Angle CBD ———— $36^{\circ} 47'$, or $\frac{3}{4}$ Points
 from S. S. W. which makes S. by E. $\frac{1}{4}$ E. for the Ship's
 Course made good.

2. For the Ship's distance BD, the operation is,
 As the Sine of the Angle CBD — $36^{\circ} 47'$ m. co. ar. 0.2227250
 Is to the side CD. ———— 35 leagues ———— 1.5440680
 So is the Sign of the angle BCD — $84^{\circ} 23'$ m. ———— 9.9979099
 To the Side BD the Ship's dist. — 58 L. $\frac{1}{4}$ parts 11.7647039

Prob. XII. Plate III. Figure VI.

Suppose a Ship sails N. E. 50 leagues, then south Easterly 85 leagues; and then forced back by foul Weather 105 leagues to the place from whence she first sailed: I demand her second Course, and her last Course back?

In the Triangle ACD, Plate III. Figure VI.
 Let A represent the Place first sailed from.
 AC the first Course and Distance, N.E. 50 leagues.
 CD the second Course and Distance south easterly 85 leag.
 DA the last Course and Distance back to the place from
 whence she first sailed, 105.

Then, for as much as here are 3 sides given, to find the Angles, they may be found by Case IV. of Oblique Triangles, thus;

The side CD is ———— 85 leagues.

The side AC is ———— 50

Added, their Sum is ———— 135

Subtracted, their difference is — 35

As the greatest side A D ———— 105 — co. ar. 7.9788107
 Is to the Sum of the 2 lesser CD & AC 135 ———— 2.1303338
 So is the difference of CD and AC — 35 ———— 1.5440680
 To FD a Part of AD ———— 45 ———— 11.6532125

This

This 45 FD being a part of the greatest side AD 105, if it be subtracted from it, the Perpendicular CB will fall in the middle of the Remainder, and so part ACD into two right-angled Triangles ABC, and BCD.

Thus the greater side AD being _____ 105 Leagues.
 The Part to be subtracted is FD _____ 45
 There remains AF _____ 60
 The half whereof is AB, or BF _____ 30 AB.
 To which add FD _____ 45
 The Sum of them is BD _____ 75 BD.

Then 1. In the right-angled Triangle ABC.

As the side AC _____ 50 leag. co. ar. 8.3010300
 Is to the Radius _____ 10.0000000
 So is the part AB _____ 30 leag. _____ 1.4771212
 To the Sine of the Angle ACB _____ 36d. 52m. _____ 9.7781512
 Which subtract from _____ 90 d. 00 m.

The Remainder is CAD _____ 53 d. 08 m. or $4\frac{1}{2}$ Points
 from NE. to the Eastward, which makes E. by S. $\frac{1}{4}$ E. from
 A to D, and W. by N. $\frac{1}{4}$ W. from D to A. which is the
 Course back to the place first sail'd from.

And 2. In the right-angled Triangle CBD.

As the side CD _____ 85 leag. co. ar. 8.0705811
 Is to the Radius _____ 10.0000000
 So is the part BD _____ 75 leag. _____ 1.8750613
 To the Sine of the Angle BCD 61 d. 56 m. _____ 9.9456414
 Which subtract from _____ 90 d. 00 m.

The Remainder is ADC _____ 28 d. 04 m. or $2\frac{1}{2}$ Points
 from W. by N. $\frac{1}{4}$ W. to the Northward, which makes N. W.
 $\frac{1}{4}$ W. from D to C, and S. E. $\frac{1}{4}$ E. from C to D, which is
 the Ships second Course.

I might add many Questions in an Oblique Triangle, but
 these are all the kinds of them, by which they may be re-
 solved. I will only add one for Diversion, before I leave
 Sailing by the Plain Chart, and in a right-angled Triangle,
 but something harder than any before it, as to the drawing

Of Plain Sailing.

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it by Scale and Compasses, or to the finding out the Rule it's resolved by; but having the Rule given, it's easy to work, as shall be shewed by and by.

The following Question was propounded by a Learner to his Master, who boasts of no small Proficiency in the Mathematicks: A Wager was laid, and referr'd to me. The Master gave his Answer, with neither Proof nor manner of working it; only saying, it was so much; upon which I told him, that was not *Artist like*; and withal, advising him to mend his Answer by a Demonstration, or at least the Rule he wrought it by; he insisted on his Answer to be true, and desired my Determination: *Then I resolved the Question by Arithmetick, from an Algebraical Theorem, composed according to the Nature of the Question*, and told him his Answer was false; at which he replied, my Answer is pretty near, and so may any Question (almost) be groped for, and sometimes a true Answer hit on; but then it's, without a Rule, for another of the like Nature

The Question hath not much difficulty in it, neither is it mentioned for the help it affords to any thing here taught, but may serve for a Diversion to young Students in the Mathematicks,

Prob. XIII. Plate III. Figure VII.

Suppose a May-Pole 150 feet high, and if in breaking the top end falls 40 feet from the lower end of the May-Pole: I demand the length of the piece broke off?

In the Triangle CBD, Plate III. Figure VII.

Let BD represent the May-Pole 150 feet high.

A the place where it breaks, and AD the piece falling down so, that the top end D reacheth to C.

BC 40 feet, the top end falls from the lower end of the May-Pole.

AC equal to AD the piece broke off.

Then, in the right-angle Triangle ABC is given one Leg, and the Sum of the Hypotenuse and the other Leg; to find the Hypotenuse; that is, BC 40, and the Sum

Sum of AC and AB 150; what is AC? Which I resolve by *Algebra*, thus,

Suppose 1. $AC + AB = 150 = b$.

2. $BC = 40 = c$.

3. $AC = a$; Then $AB = b - a$?

And — 4. $bb - 2ba + aa + cc = aa$ by 47.1 *Euclid*.

That is 5. $bb - cc = 2ba$. Therefore,

The Theorem is

$$6. \frac{bb + cc}{2b}, \text{ or } \frac{b}{2} + \frac{cc}{2b} = a = AC = AD$$

the Piece broke off. In Words thus,

The Square of the distance of the top end of the May-Pole falling from the lower-end, divided by twice its height, whose Quotient add to half its height, gives the length of the piece broke off.

Example. The distance its top end falls from the lower end 40, being squared is 1600, and then divided by twice its height 300, the Quotient is $5\frac{1}{3}$, and added to half the height 75, makes 80 $\frac{1}{3}$ for the piece broke off; Which our Wagerman (aforesaid) asserted to be 81 or 82.

This Problem may be applied to Plain Sailing, thus.

If a Ship sails between the South and the East, till the Sum of her distance and difference of Latitude together be 150 leagues, and her departure from the Meridian be 40 leagues; I demand her Course, distance run, and difference of Latitude severally?

In the foresaid Triangle CBD; Plate III. Fig. VII.

BD represents the Sum of the distance and diff. Latitude 150 Leagues.

BC the departure from the Meridian 40 leagues.

A the place the Ship set sail from.

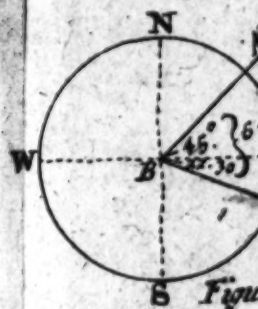
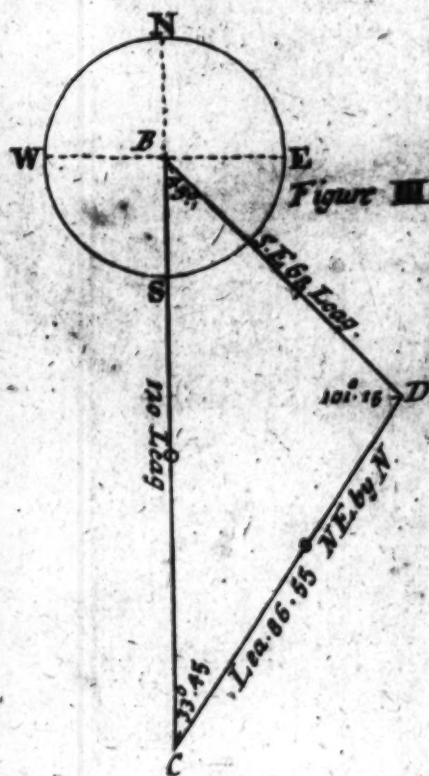
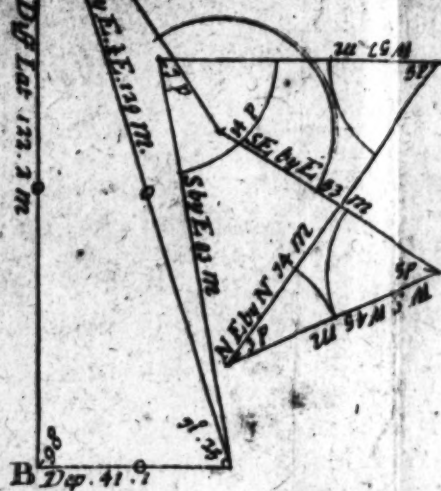
AC her distance run, which is equal to DA.

AB her difference of Latitude.

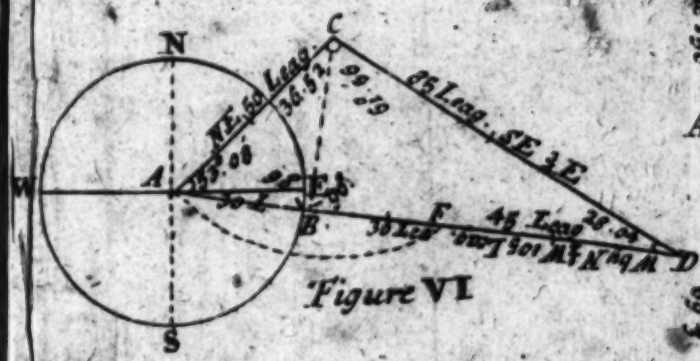
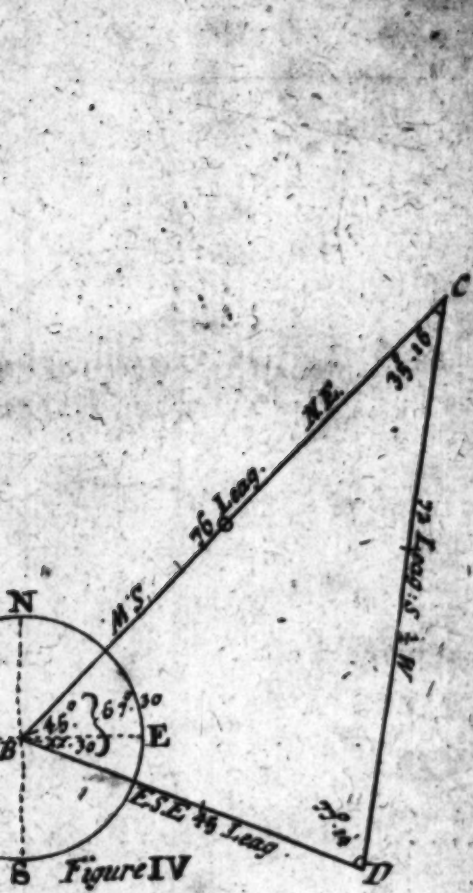
BAC her Course from the Meridian.

Now

Plate III



Place this



Now forasmuch as AC is equal to AD, therefore the angle ACD is equal to the angle ADC, and consequently the angle BAC is double to the angle BDC; and the angle BDC may be found by Case III. of Plain right-angled Triangles, which is thus;

As the side BD	_____	150 leag.co.ar.7.8239087
is to the side BC	_____	40 leag. _____ 1.6020600
So is the Radius	_____	10.0000000

To the Tang. of the angle BDC 14d. 56m. — .49.4259687
Which being doubled is — 29d. 52m. the angle BAC
the Ships Course South Easterly, or S.S.E. $\frac{1}{2}$ E. almost.

And by the Theorem before given, the Square of the Departure 40 is 1600, which divide by 300 twice the Sum of the distance and difference of Latitude, the Quotient $5\frac{1}{3}$ added to and subtracted from 75 half of the Sum of the distance and difference of Latitude, it gives $80\frac{1}{3}$ for the distance run, and $69\frac{2}{3}$ for the difference of Latitude. With which I conclude Sailing by the Plain Chart: *Mercator's Sailing* is next in order, and is as follows.

CHAP. V. Containing Problems of Sailing by Mercator's Chart, commonly called Mercator's Sailing.

HERE it will be necessary to have a Table of Meridional Parts, which I have taken out of Mr. Wright's Tables to every tenth min. of Latitude, accounting it in Miles or Minutes of the Equinoctial, the better to avoid Fractions, as he and Mr. Norwood have designed it, which is inserted towards the end of this Book.

Prob. I. To find the Meridional difference of Latitude, or the difference of Latitude in Meridional Parts.

First, If one place be under the Equinoctial and the other in North or South Latitude, the Meridional Parts (in the Table of Meridional Parts) answering to the degrees and minutes

minutes of the place having Latitude, is the Meridional diff. Latitude.

Example. One place in the Latitude 37 degrees 27 minutes North, the other under the Equinoctial, I demand the difference of Latitude in Meridional Parts.

Lat. 37 d. 27 m. ————— 2426
2426 is the Meridional diff. Latitude.

Secondly, If two places be both in North, or both in South Latitude, subtract the meridional Parts of the less Latitude from those of the greater, the Remainder is the Meridian diff. Latitude.

	<i>M. Parts.</i>
<i>Example 1.</i> One Place in the Latitude 37 d. 20 m. North	2417
The other in the Latitude 17 10 North	1045
The Meridional diff. Latitude	1372

	<i>M. Parts.</i>
<i>Example 2.</i> One place in the Latitude 45 d. 56 m. South	3109
The other in the Latitude 29 17 South	1838
The Meridian diff. Latitude	1271

Thirdly, If of the two places the one have North Latitude, the other South, add the Meridional parts of each Latitude together, the Sum is the diff. Latitude in Meridional parts.

	<i>M. Parts.</i>
<i>Example.</i> One place in the Latitude 42 d. 17 m. South	2804
The other in the Latitude 27 19 North	1704
The Meridional diff. Latitude	4508

Prob. II. Plate I. Triang. I.

Both Latitudes and the difference of Longitude between any two places being given, to find the Course and Distance.

Admit *A* the Lizard in the Latitude 50 deg. North, and *C* the Island Barbadoes in the Latitude 13 deg. 12 min. North, the difference of Longitude 54 d. 57 m. West. I demand the Course and Distance.

In the Triangle *Abc*,

Ab represents the proper difference of Latitude,

bc the

bc the Departure.

Ac the distance sailed.

bAc the Course.

Acb the Complement of the Course.

In the Triangle ABC,

AB represents the Meridional difference of Latitude.

BC the difference of Longitude.

BAC the Angle of the Course.

ACB the complement of the Course.

This being understood, the Proportions are the same as in the Doctrine of Plain right-angled Triangles.

The Difference of Longitude reduced to minutes makes 3297 min.

To find the Meridional difference of Latitude.

M. Parts.

One place in the Latitude 50 d. 00m. North ————— 3474

The other in the Latitude 13 12 --- North ————— 0799

The Meridional diff. Latitude ————— 2675

The Operation. For the Course.

As Meridional diff. Lat. 2675 min. ————— Log. 3.4273238

To Radius ————— 10.0000000

So is the diff. of Longitude 3297 min. ————— 3.5181189

To Tangent Course 50 deg. 57 min. ————— 10.0907951

The Course is South-West, half West. For the distance:

Lat. 50 d. 00 m.

Lat. 13 12

Proper Diff. Lat. ————— 36 48 which is 2208 min.

As S. C. of the Course ————— 50d. 57m. ————— Log. 9.7993394

To Proper diff. Latitude ————— 2208 min. ————— 3.3439991

To is Radius ————— 10.0000000

To the distance ————— 3505 min. ————— 3.5446597

Prob. III. Plate I. Triang. II.

Both Latitudes and the Course given, to find the Distance and Difference of Longitude.

D

Example.

Of Mercator's Sailing.

Example. A Ship sails from the *Lizard*, in the Latitude 50 deg. North, untill she be in the Latitude 13 deg. 12 m. North, her Course South-West 50 deg. 57 min. or S. W. half W. somewhat Westerly; I demand the distance and difference of Longitude.

The proper diff. Latitude is 2208 min.

The Meridional diff. Lat. is 2675 min.

The Operation.

For the Distance. Plate I. Triang. II.

As Sine Compl. of the Course 50d. 57m. ——— Log. 9.7993394

To the differ. Latit. 2208 m. ——— 3.3439991

So is Radius ——— 10.0000000

To the distance ——— 3505 m. ——— 3.5446597

For the difference of Longitude. Plate I. Triang. II.

As Radius ——— Log. 10.0000000

To Meridional Diff. Latit. 2675 m ——— 3.4273238

So is T. Course ——— 50d. 57m. ——— 10.0908560

To the difference of Longitude 3297 m. ——— 3.5181798

Prob. IV. Plate I. Triang. III.

Both Latitudes and the Distance given, to find the Course and Difference of Longitude.

Example. A Ship sails from the Latitude 50 deg. North 3505 min. untill she be in the Latitude 13 d. 12 m. North; I demand the Course and difference of Longitude.

The Meridional difference of Latitude is 2675 min.

The proper difference of Latitude is 2208 min.

The Operation,

For the Course. Plate I. Triang. III.

As the distance 3505 min. ——— Log. 3.544688

To Radius ——— 10.0000000

So is the difference of Latitude 2208 min. ——— 3.3439991

To Sine Comp. Course ——— 50d. 57m. ——— 9.7993111

Of Mercator's Sailing.

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For the difference of Longitude. Plate I. Triang. III.

As Radius ————— Log. 10.0000000

To the Merid. diff. Lat. 2675 min. ————— 3.4273238

So is T. Course 50d. 57 m. ————— 10.0908560

To the difference of Longitude 3297 m. ————— 3.5181798

Prob. V. Plate I. Triang. IV.

One Latitude, the Course and difference of Longitude being given, to find the other Latitude and the Distance.

Example. A Ship sails S. W. 50d. 57 m. or S. W. half W. somewhat more westerly from the Lat. 50d. N. until the diff. of Longit. be 3297 m. I demand the other Lat. and Distance.

The Operation. For the other Latitude.

As T. Course 50d. 57m. ————— Log. 10.0908560

To difference of Longitude 3297 min. ————— 3.5181189

So is Radius ————— 10.0000000

To the Merid. diff. Lat. 2675 min. ————— 3.4272629

M. Parts.

The Merid. parts answering to Lat. 50d. N. are — 3474

From which subtract Meridional diff. Lat. — 2675

There remains Meridional Parts ————— 799

Against which in the Table of Merid. Parts is Lat. 13d. 12 m. which is the Latitude of the place North.

For the distance. Plate I. Triang. IV.

As Sine Comp. Course 50d. 57m. ————— Log. 9.7993394

To the diff. of Latitude 2208 min. ————— 3.3439991

So is Radius ————— 10.0000000

To the distance 3505 min. ————— 3.5446597

Prob. VI. Plate I. Triang. V.

One Latitude, the Course and Distance given, to find the other Latitude and difference of Longitude.

Example. A Ship being in the Latitude 50d. North, sails S. W. 50d. 57m. or S. W. half W. and somewhat Westerly 3505 m. I demand the other Latitude and Difference of Longitude.

D 2

The

Of Mercator's Sailing.

The Operation.

For the difference of Latitude. Plate I. Triang. V.

As Radius ————— Log. 10.000000

To the distance 3505 min. ————— 3.5446886

So is S. C. Course 50 d. 57 m. ————— 9.7993394

To the proper difference of Latitude 2208 min. — 3.3440274

The other Latitude is 13 deg. 12 min. North.

The Meridional diff. Lat. is 2675 min.

For the difference of Longitude. Plate I. Triang. V.

As Radius ————— Log. 10.000000

To the Merid. diff. Lat. 2675 min ————— 3.4273238

So is T. Course 50 d. 57 m. ————— 10.0908560

To the diff. of Longitude 3297 min ————— 3.5181798

Prob. VII. Plate I. Triang. V.

*Both Latitudes, and Departure from the Meridian given; to find the Course, Distance, and Difference of Longitude.**Example.* A Ship sails from the Latitude of 50 deg North, between the South and the West, till she be in the Latitude of 13 d. 12 m. North, and her Departure from the Meridian then is 2721 min. I demand the Course, Distance, and difference of Longitude?

Latit. departed from 50d. 00m. N. Meridional Parts 3475

Latitude now in — 13d. 12m. N. Meridional Parts. 799

Difference of Latit. — 36 48 — Merid. diff. Latit. 2676

60

Minutes 2208

1. For the Course the Cannon is.

As the diff. Latitude 2208 min. ————— co. ar. 6.6560000

Is to the departure — 2721 min. ————— 3.4347281

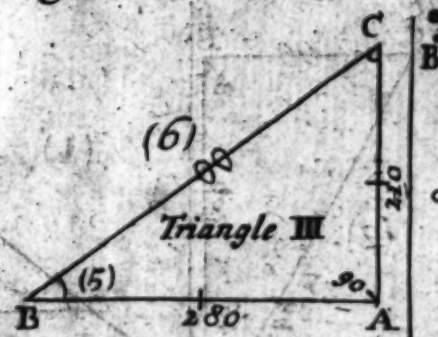
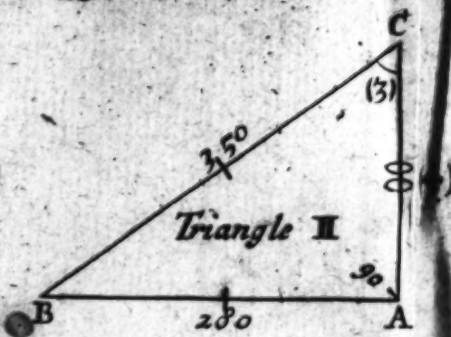
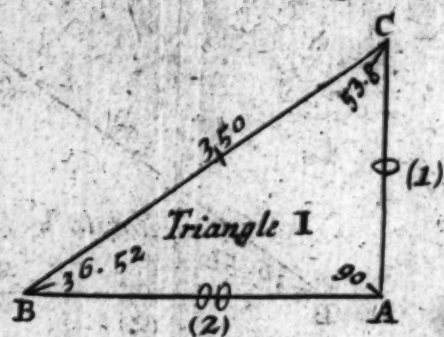
So is the Radius ————— 10.0000000

To the T. of the Course 50 d. 56 min. ————— 10.0907199

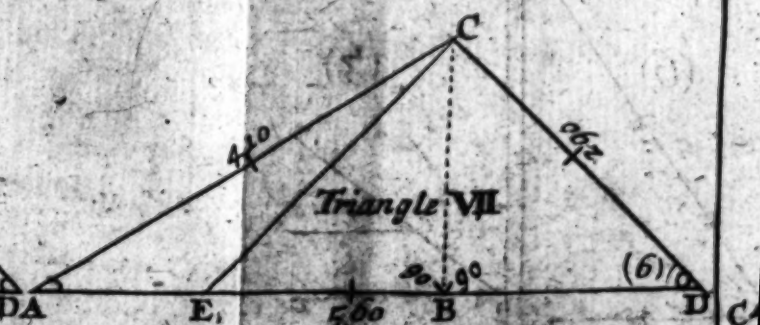
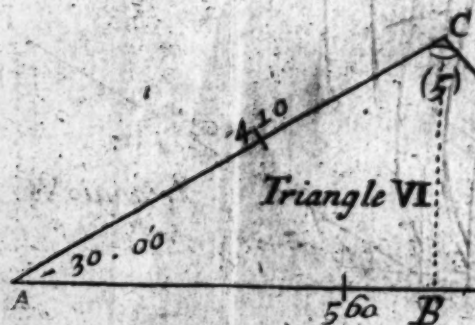
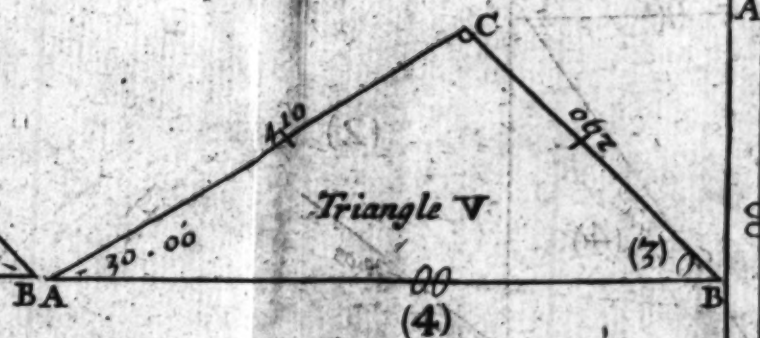
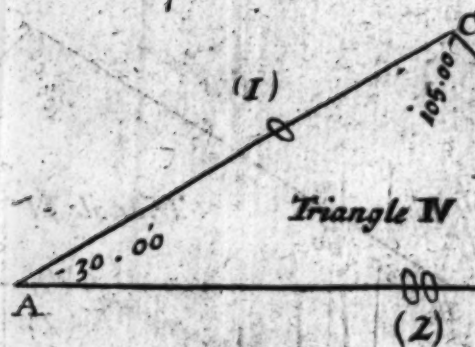
Therefore the Course is S. W. by W. $\frac{1}{2}$ W. nearest.

2. For

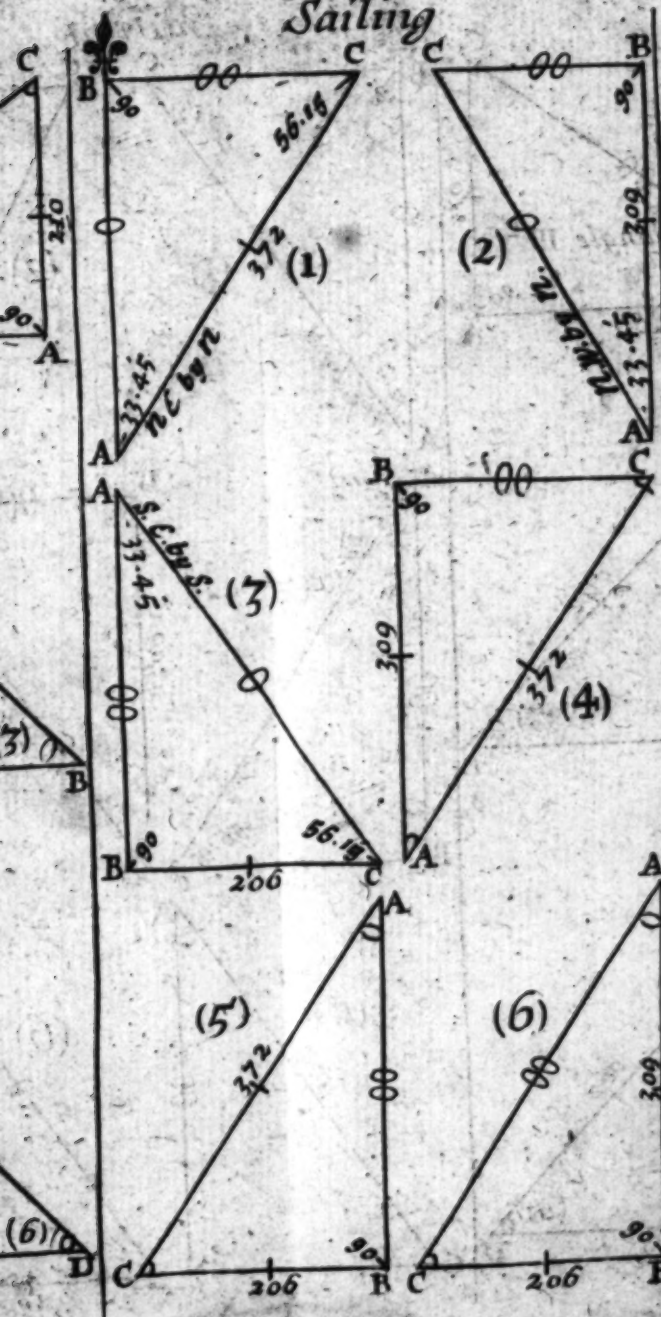
Plate I. Right Angled Plain Triangles



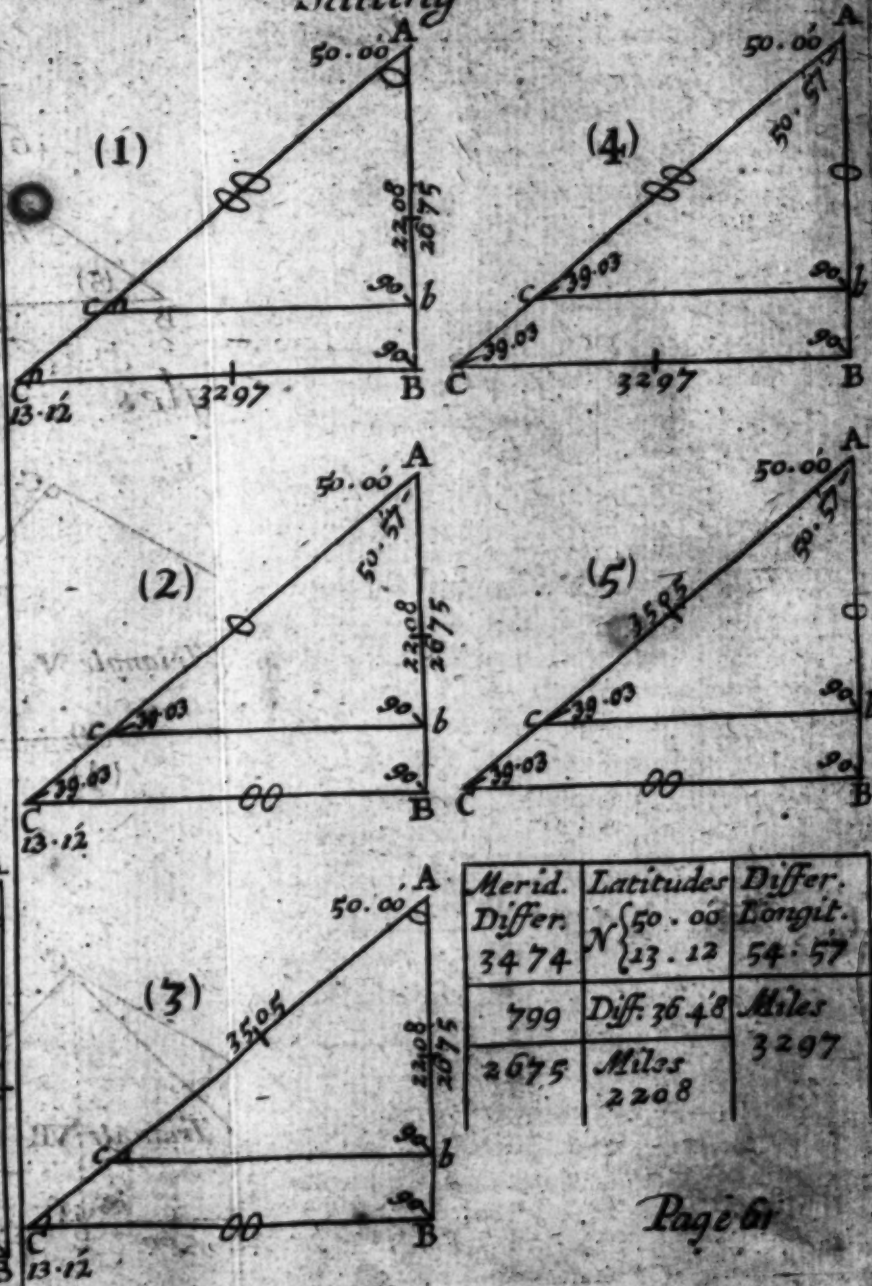
Oblique Plain Triangles



Triangles for Plain Sailing



Triangles for Mercators Sailing



Of Mercator's Sailing.

53

2. For the distance the Cannon is.

As the S. of the Course	50d. 56m.	co. ar	0.1099071
Is to the departure	2721 min.		3.4347185
So is Radius			10.0000000
To the distance sailed	3505 min		23.5446356

3. For the difference of Latitude the Cannon is.

As the difference of Lat.	2208 min.	co. ar.	6.6560009
Is to the departure	2721 min.		3.4347285
So is the Merid. diff. Lat	2676 min.		3.4274861
To the differ of Longit.	3297 min.		23.5182155

Or the difference of Longitude may be found by the Can-
nons following ;

As the Radius, is to the Meridional differ. of Latitude;

So is the Tangent of the Course, to the difference of
Longitude. Or thus,

As the Sine Complement of the Course, is to the Me-
ridional difference of Latitude ;

So is the Sine of the Course, to the difference of Lon-
gitude. Or thus,

As the Tangent Complement of the Course, is to the
Meridional difference of Latitude ;

So is the Radius, to the difference of Longitude.

Or thus,

As the Sine Complement of the middle Latitude, is to
the Radius ;

So is the departure from the Meridian, to the dif-
ference of Longitude

Note ; The middle Latitude is found by adding both
Latitudes together, and taking the half thereof, As for
Example in this VII. Prob.

Latitude departed from is	5d. 00 m.
Latitude Ship is now in	13 d. 12 m.
Their Sum is.	63 . 12
The $\frac{1}{2}$ is the middle Latitude	31 . 36
Subtract from	90 . 00
Remains Compl. of middle Latitnde	58 . 24

D 3

Prob

Prob. VIII. Two places, both in one Parallel or Latitude, and their difference of Longitude being given, to find the distance between them.

Example. Suppose two places, both in the Parallel or Latitude of 50 deg. and their difference of Longitude 70d. I demand the distance between them.

The Operation.

The difference of Longitude in Minutes is 4200.

As Radius	Log. 10.0000000
To diff. Longitude 4200 min.	3.6232493
So is S. C. Latitude 50d.	9.8080675
To the Distance 2700. min.	3.4313168

Prob. IX. Two places both in one Latitude, and their distance given, to find their difference of Longitude.

Example. Suppose two places, both in the Latitude 50d. and the distance between them being 2700 m. I demand the difference of Longitude.

The Operation.

As S. C. Latitude 50 deg.	Log. 9.8080675
To the distance 2700 min.	3.4313638
So is Radius	10.0000000
To diff. Long. 4200 min.	3.6232963

Prob. X. Two places situated both in one Parallel or Latitude, their distance and difference of Longitude being given, to find the Parallel or Latitude.

Example. A Ship sailing due West 2700 min. altereth her diff. Long. 4200 min. I demand what Latitude the Ship sails in.

The Operation.

As diff. Longitude 4200 min.	Log. 3.6232493
To Radius	10.0000000
So is the distance 2700 min.	3.4313638
To S. C. Latitude 50 deg.	9.8080675

So much for *Mercator's Sailing*, *Great Circle Sailing* is next in order.

CHAP. VI. *Shewing to sail by the Arch of a Great Circle, commonly called Great Circle Sailing:*

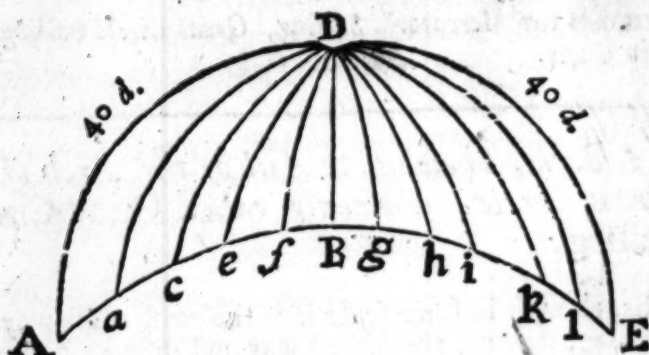
THis, though in some sense it is the most exact way of Sailing, shewing the nearest way and distance between any two places, yet it is very difficult, and not so much used as the two former kinds of Sailing, for Seamen do seldom keep their Course near this Arch, but are either drawn aside from it by some conveniences of Winds and Streams, as in Sailing to the *West-Indies*, they hale away more to the Southward; or else they are forced from this Course by cross Winds, or Interposition of some Headlands or Islands. So that their best way is to keep their Account by the former Rules. Only having Skill herein, they may see that it is many times the nearer way to leave the Rumb, and to sail more Northerly, as in sailing home from the *West-Indies*; which makes those that keep not a true Account by the former Rules, but reckon altogether by the Plain Chart, to be at the *Lands-end* many Leagues before their Account. Also in a parallel Course, as from the *Lands-end* to *New found land*, you may see how you may advantage your selves by raising and depressing the Pole 10 or 12 deg. which will be a great help for the keeping your Account, and yet go a nearer way than if you should sail in the parallel East and West.

Example. A Ship being in the Latitude 50 d. North, is bound to a Port in the same Parellel, whose difference of Long. Westerly is 47 d. I demand the Angles of Position, the distance in the Arch of a great Circle, by what Latitudes and Longitudes the Arch shall pass, likewise the Course and distance from place to place according to *Mercator*.

Let A represent the first place, E the second. ABE is the Arch of a great Circle passing over both places. D the North Pole, DA the Meridian of A, and DE the Meridian of E. The Angle ADE is 47.00. Latitude of A and E 50.00 North.

D 4

Th



The Operation.

To find the Angles of Position BAD and BED.

The Oblique-angled Triangle ADE is reduced into two equal Right-angled Triangles ABD and EBD (by letting fall the Perpendicular BD) the sides and Angles being equal; therefore in either of them there is given the Hypotenuse, and the Angle at D, to find the Angle at A or E: The Angle ADB is 23 deg. 38 min. half the difference of Longitude.

In the Triangle ABD.

As T.C. ADB, 23 d. 30 m. ————— Log 10.3616981
 To Radius ————— 10.0000000
 So is S.C. AD, 40 00 ————— 9.8842340
 To T.C. BAD, 71 35 ————— 9.5225559
 So that 71 deg. 35 min. is the Angle of Position at A, or at E. 2. To find the distance AE.

In the Triangle ABD.

As Radius ————— Log. 10.0000000
 To S. DA ————— 40 d. 00 m. ————— 9.8080675
 So is S. ADB ————— 23 3 ————— 9.6006997
 To S. AB ————— 14 51 ————— 9.4087672
 AB ————— 14 51 being doubled produces
 AE ————— 29 42 or 1782 min. their distance in the Arch of a great Circle.

3. To find the Latitudes by which the Arch shall pass at every five Degrees of Longitude from A, representing the first Port.
 First,

Of Great Circle Sailing.

57

First, You must find the greatest Latitude by which the Arch passes. In the Triangle ABD

As T. C. AD.	40 d. 00 m.	Log.	10.0761865
To Radius			10.0000000
So is S.C. ADB.	23 30		9.9622978
To T. BD	37 35		0.8862113

The Complement of B D (to 90 d.) 52 d. 25 m. is the greatest Latitude of the great Circle.

Secondly, To find the Latitude by which the Arch passes at every five Degrees of Longitude from A, you must resolve the several Right-angled Triangles BDa, BDc, BDe, &c.

Subtracting five deg. from ADB 23 d. 30 m.

There remains aDB 18. 30

Subtracting five degrees from 18 30

Remains BDc 13 30

And so for the rest as follows in the Table.

	d.	m.	
a D B	18	30	In the Triangle ABD.
B D c	13	30	To find by what Latitude the Point
B D e	08	30	(a) passes.
B D f	03	30	
B D g	01	30	As Radius ——— Log. 10 0000000
B D h	06	30	To T. C. BD 37 d. 35 m. — 10.1137122
B D i	11	30	So is S.C. aDB 71 30 — 9.9769566
B D k	16	30	To T. C. Da — 50 56 — 10.0900688.
B D l	21	30	

Long.	Lat.	
d. m.	d. m.	
A 00 00	50 00	The Complement of Da 50 d 56 m
a 05 00	50 56	North, is the Latitude of the Point (a)
c 10 00	51 38	After the same manner are found the
e 15 00	52 06	Latitudes for the Points c, e, &c. in
f 20 00	52 22	the subsequent Table.
g 25 00	52 24	Fourthly, Having the Latitudes and
h 30 00	52 14	Longitudes, by which the Arch passes,
i 35 00	51 51	you may find the Course and Distance
k 40 00	51 14	from place to place by Mercator.
l 45 00	50 24	So to find the Course and Distance a a,
E 47 00	50 00	there is given both Latit. 50° N. and 50°
		56 N. And the difference of Longi-
		tude 5° West. The

Of Great Circle Sailing.

The Meridional difference of Latitude is 87 min.

For the Course, from A to a.

As Merid. Diff. Lat. 87 m. ————— Log. 1.9395192

To Radius ————— 10.0000000

So is the diff. of Long. 300 m. ————— 2.4771212

To $\angle$ Course 73d. 49m. North Westerly ————— 10.5376020

For the Distance Aa.

As S. C. of the Course 16 deg. 11 min. ————— Log. 9.4451553

To the difference of Latitude 56 minutes ————— 1.7481880

So is Radius ————— 10.0000000

To the distance 200 minutes from A to a ————— 2.3030327

After the same manner you will find the Courses and Distances ac, ce, &c. as they follow in the Table.

Places.	Courses.	Distance.
from A to a	N W 73d. 49m.	200
from a to c	N W 77 13	189
from c to e	N W 81 28	183
from e to f	N W 85 02	184
from f to g	N W 89 22	180
from g to h	S W 86 46	176
from h to i	S W 82 58	187
from i to k	S W 78 41	188
from k to l	S W 75 14	198
from l to E	S W 72 51	81
Added up is —————		1771 min.

But in regard most of the Courses afore found are so near the West, you may sail W.N.W. 917. min. until you are in latitude 55d. 51min. North, and then W.S.W. 917 min. farther you will arrive at your Port. By this means you will alter your Latitude almost six Degrees, which is considerable, in respect of the benefit of Observation; besides the distance is but 52 min. more than that of a great Circle, and

and not above 22 min. more than the Parallel, or West distance.

For more of this kind of Sailing, see *Atkinson's Epitomy*, Chap. VII.

CHAP. VII. *Containing Astronomical Problems very useful in the Art of Navigation: Illustrated by the general Scheme, annexed.*

Astronomical Definitions.

THE Poles of the World are two fixed Points in the Heavens, diametrically opposite to one another, the one visible in our Hemisphere, called the North or Arctick Pole, noted with the Letter P, the other not seen of us, being in the lower Hemisphere, called the South or Antarctick Pole, noted with S.

The Axis of the World is an imaginary Line drawn from Pole to Pole, about which the Diurnal Motion is performed from East to West.

The Meridians are great Circles concurring and intersecting one another in the Poles of the World, as PES and PcS.

The Equinoctial or Equator, is a great Circle, 90deg. distant from the Poles of the World, cutting the Meridians at Right-angles, and dividing the World into two parts, called the North and South Hemispheres; E $\approx$ Q.

The Ecliptick is a great Circle crossing the Equinoctial in the two opposite Points *Aries* and *Libra* and making an Angle therewith (called its Obliquity) of 23d. 30m.

This Circle is divided into 12 Signs, each containing 30 d. whose Names and Characters follow.

<i>Aries</i>	♈	} which are called Nor- thern Signs.	<i>Libra</i>	♎	} these are called Southern Signs
<i>Taurus</i>	♉		<i>Scorpio</i>	♏	
<i>Gemini</i>	♊		<i>Sagittarius</i>	♐	
<i>Cancer</i>	♋		<i>Capricornus</i>	♑	
<i>Leo</i>	♌		<i>Aquarius</i>	♒	
<i>Virgo</i>	♍		<i>Pisces</i>	♓	

The

The Ecliptick is represented by $\odot \simeq \psi$

The Zodiack is a Zone having eight Degrees of Latitude on either side of the Ecliptick, in which space the Planets make the Revolutions. It is divided and distinguished by the twelve Signs.

The Colures are two Meridians dividing the Equinoctial and the Ecliptick into four equal parts, one of these passes by the Equinoctial points *Aries* and *Libra* and is called the Equinoctial Colure, as $P \simeq S$: the other by the beginning of *Cancer* and *Capricorn*, called the Solstitial Colure, $P \odot S \psi$.

The Poles of the Ecliptick are two Points $23^d. 30^m$, distant from the Poles of the World; as L and K .

The Tropicks are two small Circles parallel to the Equinoctial, and distant therefrom $23^d. 30^m$. limiting the Sun's greatest Declination.

The Northern Tropick passes by the beginning of *Cancer*, and is called the Tropick of *Cancer*; as $\odot a D$.

The Southern Tropick passes by the beginning of *Capricorn*, and is called the Tropick of *Capricorn*; as $A b \psi$.

The Polar Circles are two small Circles parallel to the Equinoctial, and distant therefrom $66^d. 30^m$. and from the Poles of the World $23^d. 30^m$.

That which is adjacent to the North Pole is called the Arctic Circle, $G d I$; & the other the Antarctic Circle, as $K d M$.

The Zenith and Nadir are two Points diametrically opposite: The Zenith is the Vertical, or the Point right over our Heads, as Z ; the Nadir is directly opposite thereto, as N .

The Azimuths, or Vertical Circles, are great Circles of the Sphere concurring and intersecting each other in the Zenith and Nadir, as $Z f N$.

The Horizon is a great Circle 90^{deg} . distant from the Zenith and Nadir, cutting all Azimuths at Right Angles, and dividing the World into two equal parts, the upper and visible Hemisphere, and the lower and invisible; This Circle is represented by $H \simeq R$.

The Meridian of a place is that Meridian which passes by the Zenith and Nadir of the place; as $P Z S N$.

The Almicanthers, or Parallels of Altitudes are small Circles parallel to the Horizon, imagined to pass through every Degree

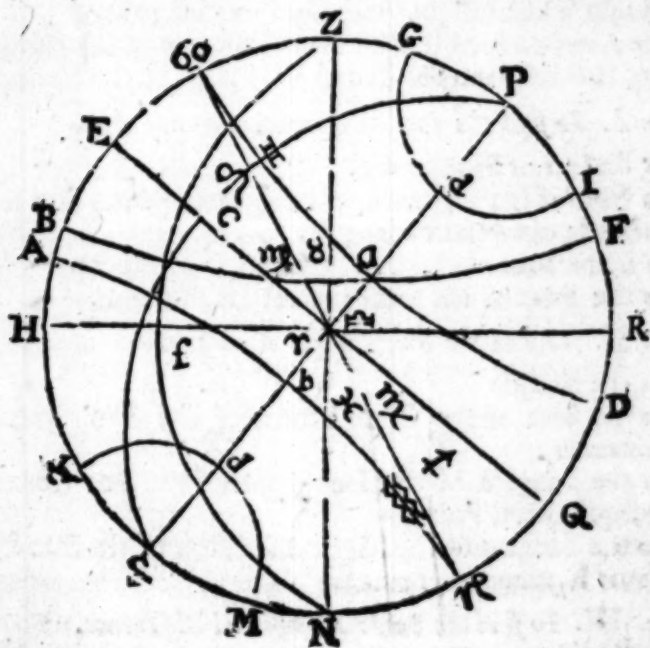
Degree and Minute of the Meridian, between the Zenith and Horizon ; as B a F.

The Parallels of Latitude or Declination are small Circles parallel to the Equinoctial : they are called Parallels of Declination in the Heavens, when applied to the Sun or Stars ; but on the Earth are called Parallels of Latitude.

The Latitude of a place is the Height of the Pole above the Horizon, or the Distance between the Zenith and the Equinoctial.

The Latitude of a Star is the Arch of a Circle contained between the Center of a Star and the Ecliptick Line, this Circle making Right Angles with the Ecliptick, and is counted either Northward or Southward, according to the situation of the Star.

Longitude on the Earth is measured by an Arch of the Equinoctial, contained between the primary or first Meridian of that place where the Longitude is assigned to begin, and the Meridian of any other place, counted always Easterly.



The

The Longitude of a Star, is that part of the Ecliptick which is contained between the Stars place in the Ecliptick, and the beginning of *Aries*, counted according to the succession of the Signs.

Altitude of the Sun or Stars is the Arch of an Azimuth, contained between the Centre of the Sun or Star and the Horizon.

Ascension is the rising of a Star, or any part of the Equinoctial above the Horizon, & Descension is the setting thereof.

Right Ascension is the number of Degrees and Minutes of the Equinoctial (counted from the beginning of *Aries*) which cometh to the Meridian with the Sun or Stars, or with any portion of the Ecliptick.

Oblique Ascension is an Arch of the Equinoctial between the beginning of *Aries* and that part of the Equinoctial that riseth with the Center of a Star, or with any portion of the Ecliptick in an Oblique Sphere.

Oblique Descension is that part which sets therewith.

Ascensional Difference is an Arch of Difference between the Right and Oblique Ascension or Descension.

The Amplitude of the Sun is the Distance of the rising or setting thereof, from the E. and W. Points of the Horizon.

Prob. I. *To find the Sun's Declination at any time.*

As Radius or Sine 90 deg.

To Sine of the Distance or Longitude of the Sun from the next Equinoctial Point ;

So is the Sine of the Suns greatest Declination.

To the Sine of the Suns present Declination.

Prob. II. *To find the Sun's Right Ascension.*

As the Radius

To the Sine of the Complement of the Sun's greatest Declination ;

So the Tangent of the Longitude of the Sun from the next Equinoctial Point.

To the Tangent of the Right Ascension of the Sun from the same Equinoctial Point.

Prob. III. *To find the Sun's Ascensional Difference.*

As Radius

To the Tangent of the Poles height ;

So

So the *Tangent* of the Sun's Declination,
To the Sine of the Sun's Ascensional Difference.

Which brought into Hours and Minutes, and added to
or subtracted from the hour of fix, shews the Sun's rising
and setting:

Prob. IV. *To find the Sun's Amplitude.*

As the Sine Complement of the Poles height,
To the Sine of the Sun's Declination;
So is Radius
To the Sine of the Sun's Amplitude.

Prob. V. *To find the Sun's Horary Distance from the Meridian,
when he is due East or West.*

As the Tangent of the Poles height,
Is to the Radius
So the *Tangent* of the Sun's Declination,
To the Sine of the Sun's Horary distance from the Hour
of Six, being just East or West.

Prob. VI. *To find the Altitude of the Sun, being just E. or W.*

As the Sine of the Poles height,
Is to the Radius;
So the Sine of the Sun's Declination,
To the Sine of the Sun's height being just East or West.

Prob. VII. *To find the Sun's Altitude at the Hour of Six.*

As the Radius,
To the Sine of the Poles height;
So the Sine of the Sun's Declination;
To the Sine of the Sun's height at the hour of fix.

Prob. VIII. *To find the Sun's Azimuth at the Hour of Six.*

As the Radius,
To the Co-sine of the Poles height;
So the *Tangent* of the Sun's Declination;
To the *Tangent* of the Sun's Azimuth from the East or
West at the Hour of fix.

Prob. IX. *To find the Sun's Altitude at any time of the day.*

As the Radius,
To the Co-tangent of the Poles height.

So is the Sine of the Sun's Distance from the Hour of fix,
To the *Tangent* of an Arch.

Which being subtracted out of the Sun's Distance from
the Pole, call it the remaining Arch.

As the Co-sine of the Arch found,
To the Co-sine of the remaining Arch;
So is the Sine of the Poles height.

To the Sine of the Sun's Altitude at the Hour required.

Prob. X. *To find the Hour of the Day by the height of the Sun.*

Take the Complement of the Sun's height, the Complement of the Latitude of the place, and the Complement of the Declination of the Sun, or Distance from the elevated Pole, and add these three Sides together, and find the Difference between their half sum and the Complement of the Sun's Altitude, then work thus.

To the Complement Arithmetical of the Logarithm Sines of the Co-latitude and Co-declination, or Sun's Distance from the Pole.

Add the Logar. of the Sines of the half sum and Difference.

Half the sum of these four Logarithms is the Sine of an Arch, whose Complement being doubled, will be the Distance of the Sun from the Meridian; which converted into Time will shew the Hour of the Day.

Prob. XI. *To find the Azimuth by the Sun's Height.*

Take the Complement of the Sun's Declination or distance from the elevated Pole, the Complement of the Latitude, and the Complement of the Sun's height, and add these three sides together, and find their difference between their half sum, and the distance from the Pole, then work thus,

To the Complement Arithmetical of the Logarithm Sines of the Co-altitude and Co-latitude,

Add the Logarithm Sines of the half sum and difference;

Half the sum of these four Logarithms is the sine of an Arch whose Complement being doubled, is the Azimuth desired.

Prob. XII. *Having the Sun's Azimuth and Altitude, to find the Hour.*

As the Sine Complement of the Sun's Declination,
To the Sine of the Sun's Azimuth;
So the Sine Complement of the Sun's height,
To the Sine of the Sun's Horary distance from the Meridian,

Prob. XIII. *Having the Longitude and Latitude of any Star,
to find the Right Ascension and Declination thereof.*

1. As the Radius,
To the Sine of the Stars Longitude, from the next
Equinoctial Point :

So the Co-tangent of the Stars Latitude,
To the Tangent of a fourth Arch.

Compare this fourth Arch with the Arch of Distance between the Poles of the World and the Ecliptick, 23 d. 30 m. and if the Latitude and Longitude of the Star be both of one quality, that is, when the Star hath North Latitude in the six Northern Signs Υ Θ Π $\oplus$ Ω ♊ , or South Latitude in the 6 Southern Signs ♋ ♌ ♍ ♎ ♏ ♐ , then shall the Difference between this fourth Arch, and the Distance of the Poles 23 d. 30 m. be your fifth Arch.

But if the Longitude and Latitude of the Star be of contrary qualities, that is, one Northern and the other Southern, then add this fourth Arch to the Distance of the Poles 23 d. 30 m. and the Sum thereof shall be your fifth Arch; with which proceed.

2. As the Sine of the fourth Arch,
To the Sine of the fifth Arch;
So the T. of the Stars Long. from the next Equinoct. Point.
To the Tangent of the Stars Right Ascension from the next Equinoctial Point.

3. As the Cosine of the fourth Arch,
To the Cosine of the fifth Arch;
So the Sine of the Stars Latitude,
To the Sine of the Stars Declination.

Lastly, for Proof of your Work.

4. As the Co-sine of the Stars Latitude,
To the Cosine of the Stars right Ascension;
So the Cosine of the Declination,
To the Cosine of Longitude,
And thus having found the right ascension and declination

of any *Star*, you may by the former Rules find its Amplitude; its Difference of Ascension, its Distance from the Meridian at any height observ'd, and so the Hour of the Night thereby, having first the time of its coming to the South, by subtracting the Right Ascension of the Sun, from the Right Ascension of the Star; adding 360 *deg.* to the Stars Right Ascension, when it is less than the *Suns*.

How these with many other Astronomical Problems, are represented for the Projection of the *Sphere* is taught in Chap. IX. of the fore said Book.

CHAP. VIII. *Containing Problems of Geography.*

Prob. I. *To find the Distance of any two Places which differ only in Latitude, being both upon the same Meridian.*

1. IF the two places are upon the same side of the Equinoctial; subtract the lesser Latitude out of the greater, the Remainder is the distance required.

2. If the one place be on the one side of the Equinoctial, and the other on the other; Add the two Latitudes together, and the Sum is the Distance required.

Prob. II. *To know the Distance of any two Places, which differ only in Longitude.*

1. If the places are both of them under the Equinoctial subtract the lesser Longitude out of the greater, the Remainder is the distance.

2. If the two places have the same Latitude, and so under the same parallel, then,

As the Radius,

To the Cosine of their Latitude :

So the Sine of half their Difference of Longitude,

To the Sine of half their Distance.

Prob. III. *To find the Distance of two places which differ both in Longitude and Latitude.*

This Proposition hath three Cases.

Case. I. When one place is under the Equinoctial, and the other towards either of the Poles, Then,

*As the Radius,
To the Cosine of their Difference of Longitude :
So the Cosine of their Latitude,
To the Cosine of the Distance.*

Case. II. When both places are towards one of the Poles.

First, *As the Radius,
To the Cosine of the difference of Longitude :
So the Co-tangent of the lesser Latitude,
To the tangent of a fourth Arch.*

Which being subtracted out of the Complement of the greater Latitude, the Remainder must be your fifth Arch: Then,

*As the Cosine of the fourth Arch,
To the Cosine of the fifth Arch :
So the Sine of the lesser Latitude,
To the Cosine of the Distance required.*

Case. III. When one place is toward the North Pole, and the other towards the South Pole : First,

*As the Radius,
To the Cosine of their Difference of Longitude :
So the Cotangent of one of the Latitudes,
To the Tangent of a fourth Arch.*

Which being subtracted out of the Sum of the other Latitude, and 90 deg. the Remainder is the fifth Arch: Then,

*As the Cosine of the fourth Arch :
To the Cosine of the fifth Arch :
So the Sine of the Latitude first taken,
To the Cosine of their Distance :*

By these Rules also you may find the Distance of any two Stars, if you know their Longitude and Latitude, or their Right Ascension and Declination, which is of good use in Astronomy.

How to find the Variation of the Compass.

BY the fourth Problem of the seventh Chap. you may find the Sun's Amplitude by Calculation, which I call the true Amplitude, and by the Amplitude Compass you may observe the Sun's Amplitude either at Sun rising or setting, which I call the Magnetical (or Compass) Amplitude. If

The Variation of the Compass.

these two Amplitudes agree (which is very seldom,) there is no Variation, but if they do not agree, the Difference between them being rightly accounted, is the Variation of the Compass.

Likewise by the eleventh Problem of the seventh Chapter you may find the Sun's Azimuth by Calculation, which I call the true Azimuth, and by the Azimuth Compass you may observe the Sun's Azimuth, either in the Forenoon or Afternoon, the Sun about 10 or 15 d. high, and this I call the Magnetical Azimuth.

Note, you may see the use of the Azimuth Compass, in observing the Magnetical Azimuth or Amplitude, in a useful Treatise called Practical Navigation.

Example. Suppose the true Amplitude be East 32 d. Northerly, and the Magnetical Amplitude East 27 d. Northerly, the Difference is 5 d. which is the variation, almost half a Point of the Compass.

Suppose the true Azimuth to be West 12 d. 30 m. Southerly, and the magnetical to be West, 14 d. 30 m. Northerly, 12 d. 30. added to 14 d. 30 m. the one being Northerly and the other Southerly, make the Difference between the Azimuths to be 27 d. and that is the Variation almost two points and an half of the Compass.

To find which way the Compass varies.

Supposing your self to look directly towards the Coast of the true Amplitude or Azimuth, consider whether the Magnetical Amplitude or Azimuth be towards the right or towards the left hand; if it be towards the right hand the Variation is Westerly, if towards the left, Easterly.

Example. Suppose the true Amplitude to be West 12 deg. 30 min. southerly, and the Magnetical to be 14 deg. 30 minutes Northerly, then if I look towards the true Amplitude West 12 deg. 30 min. (for about one Point) Southerly, the Magnetical Amplitude 14 deg. 30 min. Northerly is towards the right hand, and therefore the variation is westerly 27 deg.

Suppose the true Azimuth to be W.N.W. and the Magnetical W.by S. if you look towards the W.N.W. then the W.by S. is on your left hand, and the Variation is Easterly three Points. But this Proposition may be performed most

readily

Deg. of Latitude	A Table of Meridional Miles.						Difference.
	<i>The Minutes of each Degree.</i>						
	0	10	20	30	40	50	
	<i>The Meridional Miles.</i>						
0	0	10	20	30	40	50	10
1	60	70	80	90	100	110	10
2	120	130	140	150	160	170	10
3	180	190	200	210	220	230	10
4	240	250	260	270	280	290	10
5	300	310	320	330	340	350	10
6	361	371	381	391	401	411	10
7	421	431	441	451	461	471	10
8	481	492	502	512	522	532	10
9	542	552	562	572	583	593	10
10	603	613	623	633	644	654	10
11	664	674	684	695	705	715	10
12	725	735	746	756	766	776	10
13	787	797	807	817	828	838	10
14	849	859	869	879	890	900	10
15	910	920	931	941	952	962	10
16	973	983	993	1004	1014	1025	10
17	1035	1046	1056	1067	1077	1088	10
18	1098	1109	1119	1130	1140	1151	10
19	1161	1172	1183	1193	1204	1214	10
20	1225	1236	1246	1257	1268	1270	11
21	1289	1300	1311	1321	1332	1343	11
22	1354	1364	1375	1386	1397	1408	11
23	1419	1429	1440	1451	1462	1473	11
24	1484	1495	1505	1517	1528	1539	11
25	1550	1551	1572	1583	1594	1605	11
26	1616	1628	1639	1650	1661	1672	11
27	1683	1694	1705	1717	1728	1740	11
28	1751	1762	1774	1785	1797	1808	11
29	1819	1831	1842	1854	1865	1877	11

Deg. of Latitude.	A Table of Meridional Miles.						Difference.
	The Minutes of each Degree.						
	0	10	20	30	40	50	
	The Meridional Miles.						
30	1888	1900	1911	1923	1935	1946	12
31	1958	1970	1981	1993	2005	2017	12
32	2028	2040	2052	2064	2076	2088	12
33	2099	2011	2123	2135	2147	2159	12
34	2171	2183	2106	2208	2222	2231	12
35	2244	2256	2269	2281	2293	2306	12
36	2318	2330	2343	2355	2368	2380	12
37	2393	2405	2418	2430	2443	2456	12
38	2468	2481	2494	2506	2519	2532	13
39	2545	2558	2571	2584	2597	2610	13
40	2623	2636	2649	2662	2675	2688	13
41	2702	2715	2728	2741	2755	2708	13
42	2782	2795	2809	2822	2830	2849	13
43	2863	2877	2890	2904	2918	2932	14
44	2946	2960	2974	2986	3001	3016	14
45	3030	3044	3058	3073	3187	3101	14
46	3116	3130	3144	3159	3173	3188	14
47	3202	3217	3232	3247	3261	3277	15
48	3292	3307	3322	3337	3352	3367	15
49	3382	3397	3413	3428	3443	3459	15
50	3475	3400	3506	3521	3537	3553	16
51	3569	3585	3600	3617	3633	3649	16
52	3665	3682	3698	3714	3731	3747	16
53	3765	3780	3797	3814	3831	3848	17
54	3865	3882	3899	3916	3933	3952	17
55	3968	3986	4003	4021	4038	4056	18
56	4074	4092	4110	4128	4146	4164	19
57	4183	4201	4220	4238	4257	4276	19
58	4294	4313	4332	4351	4371	4390	20
59	4409	4429	4448	4468	4488	4508	20

Deg. of Latitude

A Table of Meridional Miles.

The Minutes of each Degree.

0 | 10 | 20 | 30 | 40 | 50

The Meridional Miles:

Difference.

60	4528	4548	4568	4588	4608	4029	20
61	4649	4670	4691	4712	4733	4754	21
62	4775	4794	4818	4840	4861	4883	22
63	4905	4927	4950	4972	4994	5017	23
64	5040	5062	5086	5109	5132	5156	23
65	5179	5203	5227	5251	5275	5299	24
66	5324	5349	5373	5398	5424	5449	25
67	5474	5500	5526	5552	5578	5605	26
68	5631	5658	5685	5712	5740	5767	27
69	5795	5823	5851	5880	5909	5937	28
70	5967	5996	6026	6055	6085	6116	30
71	6146	6177	6208	6240	6271	6303	31
72	6336	6368	6401	6434	6468	6501	33
73	6535	6570	6605	6639	6675	6711	35
74	6747	6783	6820	6857	6895	6933	37
75	6971	7010	7050	7089	7130	7170	40
76	7211	7253	7295	7338	7381	7424	43
77	7649	7513	7559	7605	7651	7698	46
78	7746	7795	7844	7894	7944	7995	50
79	8047	8100	8154	8208	8264	8320	55
80	8377	8435	8494	8555	8616	8678	60
81	8741	8806	8872	8939	9007	9077	68
82	9148	9221	9295	9371	9449	9528	77
83	9609	9692	9777	9865	9954	10046	88
84	10148	10238	10338	10441	10547	10656	105
85	10770	10886	11007	11133	11253	11398	128
86	11539	11686	11839	11999	12167	12344	165
87	12521	12718	12927	13150	13388	13643	230
88	13920	14223	14550	14914	15321	15783	386
89	16317	16950	17726	18729	20152	22623	

A Table of Proportional Parts.

D.	1	2	3	4	5	6	7	8	9
10	1	2	3	4	5	6	7	8	9
11	1	2	3	4	5	7	8	9	10
12	1	2	4	5	6	7	8	10	11
13	1	3	4	5	7	8	9	10	12
14	1	3	4	6	7	8	10	11	13
15	1	3	4	6	7	9	10	12	13
16	2	3	5	6	8	10	11	13	14
17	2	3	5	7	8	10	12	14	15
18	2	4	5	7	9	11	13	14	16
19	2	4	6	8	9	11	13	15	17
20	2	4	6	8	10	12	14	16	18
21	2	4	6	8	10	13	15	17	19
22	2	4	7	9	10	13	15	18	20
23	2	5	7	9	11	14	16	18	21
24	2	5	7	10	12	14	17	19	22
25	2	5	7	10	12	15	17	20	22
26	3	5	8	10	13	16	18	21	23
27	3	5	8	11	13	16	19	22	24
28	3	6	8	11	14	17	20	22	25
30	3	6	9	12	15	18	21	24	27
33	3	7	10	13	16	20	23	26	30
35	3	7	10	14	17	21	24	28	31
37	4	7	11	15	18	22	26	30	33
40	5	8	12	16	20	24	28	32	36
55	5	11	16	22	27	33	38	44	49
60	6	12	18	24	30	36	42	48	54
68	6	13	20	27	34	40	47	54	61
77	7	15	23	30	38	46	53	61	69
88	8	17	26	35	44	52	61	70	79
105	10	21	31	42	52	63	73	84	94
128	12	25	38	51	64	76	89	102	115
165	16	33	49	66	82	99	115	132	148
220	23	46	69	92	115	138	161	184	207
386	38	77	115	154	192	231	270	308	347

A Table of the Sun's Right Ascension.

		January.		February.		March.		April.		May.		June.	
		Ascen.		Ascen.		Ascen.		Ascen.		Ascen.		Ascen.	
		H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	0	19	35	21	42	23	28	2	21	3	14	5	19
2	1	19	39	21	46	23	32	2	25	3	18	5	23
3	2	19	43	21	50	23	36	2	29	3	22	5	27
4	3	19	47	21	54	23	39	2	33	3	26	5	31
5	4	19	51	21	58	23	43	2	36	3	30	5	36
6	5	19	56	22	02	23	46	2	40	3	34	5	40
7	6	20	00	22	06	23	50	2	44	3	38	5	44
8	7	20	04	22	10	23	53	2	47	3	42	5	48
9	8	20	08	22	14	23	57	2	51	3	46	5	52
10	9	20	13	22	17	0	01	2	54	3	50	5	56
11	10	20	17	22	21	0	05	2	58	3	54	6	00
12	11	20	22	22	25	0	08	2	02	3	58	6	04
13	12	20	26	22	29	0	12	2	06	4	02	6	08
14	13	20	30	22	33	0	15	2	10	4	06	6	12
15	14	20	34	22	36	0	19	2	13	4	10	6	17
16	15	20	38	22	40	0	23	2	17	4	14	6	21
17	16	20	42	22	44	0	26	2	21	4	18	6	25
18	17	20	46	22	48	0	30	2	25	4	22	6	29
19	18	20	50	22	52	0	33	2	29	4	26	6	33
20	19	20	54	22	55	0	37	2	32	4	30	6	38
21	20	20	58	22	59	0	41	2	36	4	34	6	42
22	21	21	03	23	03	0	44	2	40	4	38	6	46
23	22	21	07	23	06	0	48	2	44	4	42	6	50
24	23	21	11	23	10	0	52	2	48	4	46	6	54
25	24	21	15	23	13	0	55	2	51	4	50	6	58
26	25	21	19	23	17	0	59	2	55	4	54	7	02
27	26	21	23	23	21	1	03	2	59	4	58	7	06
28	27	21	27	23	25	1	06	3	03	5	02	7	10
29	28	21	31			1	10	3	07	5	06	7	14
30	29	21	35			1	14	3	10	5	11	7	19
31	30	21	39			1	17			5	15		

A Table of the Sun's Right Ascension.

	Day	July		August		Septem.		October		Novemb.		Decem.	
		Ascen.	H.	Ascen.	M.	Ascen.	M.	Ascen.	M.	Ascen.	M.	Ascen.	M.
1	7	28	9	25	11	19	13	08	15	07	17	11	17
2	7	27	9	29	11	23	13	12	15	11	17	11	17
3	7	31	9	33	11	26	13	15	15	14	17	11	17
4	7	35	9	37	11	30	13	19	15	18	17	11	17
5	7	39	9	40	11	33	13	23	15	23	17	11	17
6	7	43	9	44	11	3	13	26	15	27	17	11	17
7	7	47	9	48	11	4	13	30	15	31	17	11	17
8	7	51	9	51	11	44	13	34	15	36	17	11	17
9	7	55	9	55	11	48	13	38	15	40	17	11	17
10	7	59	9	58	11	51	13	41	15	45	17	11	17
11	8	03	10	02	11	55	13	45	15	49	18	11	18
12	8	07	10	06	11	59	13	49	15	53	18	11	18
13	8	11	10	10	12	02	13	53	15	58	18	11	18
14	8	15	10	14	12	06	13	57	15	02	18	11	18
15	8	19	10	17	12	09	14	00	16	07	18	11	18
16	8	23	10	21	12	13	14	04	16	11	18	11	18
17	8	27	10	25	12	17	14	08	16	15	18	11	18
18	8	31	10	28	12	20	14	12	16	19	18	11	18
19	8	35	10	32	12	24	14	16	16	23	18	11	18
20	8	39	10	35	12	27	14	20	16	28	18	11	18
21	8	43	10	39	12	31	14	24	16	32	18	11	18
22	8	47	10	43	12	35	14	28	16	36	18	11	18
23	8	51	10	46	12	38	14	32	16	40	18	11	18
24	8	55	10	50	12	42	14	36	16	44	18	11	18
25	8	58	10	53	12	45	14	39	16	49	18	11	18
26	9	02	10	57	12	49	14	43	16	53	17	11	17
27	9	06	11	01	12	53	14	47	16	57	17	11	17
28	9	10	11	04	12	57	14	51	17	02	17	11	17
29	9	14	11	08	13	01	14	55	17	06	17	11	17
30	9	17	11	11	13	04	14	59	17	11	17	11	17
31	9	21	11	15	13	08	15	03	17	15	17	11	17

A Table of the Fixed Stars

A Table of the Right Ascension and Declination of some of the most Notable Fixed Stars.

Stars Names.	Mag.	Right Ascens.	Declina- tion. or S.
Pole Star	2	00 36 8	33 N
The upper of the two foremost of the square in the Little Bear	2	14 51 75	20 N
The upper of the two foremost of the square in the great Bear	2	10 43 05	32 N
The lower of the two foremost of the square in the great Bear	2	10 42 58	68 N
The lower of the two latter of the square in the great Bear	2	11 30 55	33 N
The upper of the two latter in the square of the great Bear	2	11 59 58	51 N
Last but two in the great Bear's Tail	2	12 40 57	47 N
Last but one in the same	2	13 10 50	41 N
Last in the same	2	13 34 11	00 N
The Dragon's Tail	2	13 59 55	50 N
Arcturus	1	14 01 20	28 N
Brightest in the Crown	2	15 21 27	51 N
Brightest in the Harp	2	18 40 38	30 N
Swans Tail	2	20 30 44	05 N
Perseus Right side	2	02 57 48	29 N
Head of Capella	1	04 52 45	37 N
Antares Right Shoulder	2	05 44 44	50 N
Brightest in the Serpent's Neck	2	15 28 07	30 N
Brightest between the Eagles Shoulders	2	19 35 08	03 N
First in Pegasus wing or Marchab	2	22 48 13	28 N
Beginning of Pegasus Leg	2	22 48 26	18 N
End of Pegasus Wing	2	23 57 13	22 N
Andromedas Head	2	23 52 27	18 N

A Table of the Fixed Stars.

Stars Names.	Mags.	Right Ascension.			
		H.	M.	D.	M.
Southernmost in Andromedas girdle	2	00	51	33	55
Andromedas Southernmost Foot	2	01	44	40	44
The Bulls Eye, or Aldebaran	1	04	17	15	48
End of the Bulls horn	2	05	06	28	21
Castor	2	07	14	32	33
Pollux	2	07	25	28	46
Bright East of Gemini	2	08	19	16	38
Brightest in the Lions Neck	2	10	02	21	29
Lions Heart	1	09	51	12	33
Lions Tail	1	11	32	16	25
Virgins Spike	1	13	08	09	31
Southernmost scale of Libra	2	14	33	14	37
Northernmost scale of Libra	2	14	59	08	09
Scorpions Forehead	2	16	46	18	51
Scorpions Heart	1	16	10	26	37
Fomahant	1	22	39	31	17
Whales Jaw	2	02	45	02	42
Orions Right Shoulder	2	05	38	09	18
Orions Left Shoulder	2	04	08	06	01
First in Orions Belt	2	05	15	00	35
Middle of Orions Belt	2	05	20	01	26
Last in Orions Belt	2	05	24	02	09
Orions Left Foot, or Regel	1	04	59	08	37
Mouth of the great Dog, or Sirius	1	06	31	16	14
Right Fore foot of the great Dog	2	06	09	17	49
Little Dogs Thigh	2	07	22	06	03
Hydras Heart	1	09	12	07	15

Here followeth a TABLE of the
Latitude and Longitude of the
Principal Places, &c.

A Table of the Latitude and Longitude of the Principal Ports, Harbours, Headlands and Islands in the World; beginning from the Meridian of Pico Teneriffa, newly corrected according to the best Observation.

Those Places which are in South Latitude are marked with the Letter S. all the rest are in North Latitude.

		Latitude		Longit.
		D.	M.D.	M.
Greenland.	H Aehlits Headland	79	26	55
	Fair Foreland	79	24	50
	Point look-out	76	35	00
	Cape Blanco	78	38	00
	Hopeless Isles	77	42	30
	Hope Island	76	43	50
	Cherry Island	74	34	10
	Ice Point	77	30	50
The Sea Coasts of Nova Zembla.	Admiralties Island	75	73	35
	Langens	74	08	50
	Cross Point	72	58	05
	Fretum Burrough	70	49	00
	Maritus Isle	71	72	10
Lapland and Norway	Archangel	63	55	28
	Cape Gardnoff	65	58	02
	Fox Naxi	64	37	07
	Cape Gallant	64	39	32
	Cape Race	64	40	04
	Island Milduym	61	38	05
	North Cape	71	32	35
	Ross Isles	67	35	06
	Catfells	61	18	42
Nase of Norway		58	02	02

A Table of Latitude and Longitude.

		D.	M.	D.	M.
The Sound.	The Nyding	57	00	25	40
	Scarlet Island	56	00	26	38
	Falsterborn	56	53	26	25
	Abbo	61	08	34	30
	Dugart	59	44	34	27
	Gotland	58	20	31	05
	Burnt Holm	56	00	28	16
Flanders.	Elisnore 1	56	40	25	57
	The Scam	57	52	24	27
	Bozenburg	56	20	23	56
	Wol land	54	30	22	14
	The Texel	53	20	20	56
	The Brill	52	08	19	44
	Calice	51	13	17	53
The Sea-Coasts of Ireland.	Longin's	67	20	03	45
	Mare	68	51	35	10
	Snow-Hill	64	40	34	40
	Marcbour's Foreland	63	38	35	40
	Whale Back	65	18	00	00
Isles in Scotl.	St. Kilda	58	02	05	56
	Skj Island	57	40	10	08
	Kewis Island	58	30	08	00
	Shetland	60	22	14	30
	Isles of Orkney	58	30	13	25
England, Scotland	Catness	58	37	13	24
	Hucan's	58	00	14	32
	St. Abbs Head	56	25	14	13
	Tinmouth	56	08	15	00
	Flamborough Head	54	08	16	26
	The Sporne	53	45	16	51
Winterton's		52	52	18	00

A Table of Latitude and Longitude.

Table of Latitude and Longitude

		D.	M.	D.	M.
England.	Orfordness	52	30	18	01
	The North Foreland	51	32	17	40
	The South Foreland	51	32	17	42
	Dover	51	02	27	14
	Isle of Wight	50	24	14	47
	Portland	50	20	13	46
	The Start	50	37	13	09
	The Lizard	50	00	13	37
	Islands of Scilly	50	07	09	47
	Lundy Is.	51	22	11	57
The Sea-Coast of Ireland.	St. David's Head	51	54	11	18
	Malin Head	56	44	31	44
	Isle of Man	54	25	11	45
	Foxe's Foreland	55	35	10	16
	Black Rock	53	52	06	00
	Slieve Head	55	16	06	00
	Blasket	52	16	05	20
	Cape Clear	51	15	06	26
	Old Head	51	20	07	32
	Horn Point	53	05	10	04
Portugal, Spain, France.	Sain Head	30	04	16	30
	Cape Hope	30	04	15	05
	Gardiny	49	55	14	20
	Torrey	49	50	14	46
	Ushant	48	20	11	16
	Cape Ortgal	44	07	09	16
	Cape Finisterre	43	10	06	58
	The Rock of Lisbon	38	11	06	43
	Cape St. Vincent	37	00	07	20
	The Straights of Gibraltar	36	09	10	40

A Table of Latitude and Longitude.

	D.	M.	D.	M.
<i>The Main Continent of the Straits.</i>				
Cape de Gatta	36	47	16	08
Cape St. Martin	38	46	18	57
Cape de Dago Frita	41	41	21	49
Cape Melle	43	51	26	21
Cape Sparteventura	37	46	36	06
Cape St. Maria	39	52	38	26
Cape St. Angelo	37	15	43	56
Cape Saradoni	34	35	48	46
Cape de Bacur	32	40	50	38
Cape Rosato	31	58	40	28
Cape Bona	37	54	30	12
Tunis	36	40	19	46
Tangier	35	36	11	39
<i>The Sea Coast of</i>				
Algeran	37	32	14	10
Formetava	38	44	19	81
Alca	39	05	19	54
Alajore	39	38	21	28
Alajore	39	55	23	30
Cape Palo in Sardinia	38	58	27	36
Cape Corso in Corsica	42	51	27	32
Lampadofa	55	58	31	52
Malta	36	00	33	12
Cape Passaro in Sicily	37	10	34	50
Aliffina	38	07	35	08
Corfu	39	25	39	18
Cephalonia	38	38	40	25
Zant	37	37	40	40
West end of Candia	35	15	43	00
East end of Candia	35	04	46	28
Rhodes	35	40	48	00
West end of Cyprus	34	22	51	34
East end of Cyprus	34	48	54	35

A Table of Latitude and Longitude.

	D.	M.	M.	D.
Cape de Verde Islands.				
The West side of St. Antonio	11	17	00	350 00
The East point of St. Vincent	17	40	350	08
The East side of St. Jago.	13	00	353	30
The East side of Isle de Mayo.	15	00	353	04
The East side of Bona Vista	18	00	353	04
St. Matthews	01	34	11	32
Affensou	08	00	04	30
St. Helena	16	00	13	30
St. Helena Nova	16	00	34	48
The Sea Coast of				
Main Continent in East India.				
Cape Aguilhas	35	00	39	30
Cape Corrientes	23	00	36	00
Cape de Guada	15	00	39	58
Cape de Guardafiu	11	40	74	13
Cape de Rasalgate	22	00	84	18
Suvarat	21	00	96	20
Ooa	5	40	97	00
Cape Comeris	07	32	99	13
South West point of Ceylon	06	00	101	50
River Bengale	20	00	110	20
Syam	14	32	123	45
Vilchers Point	20	18	131	00
Point of Cavallos	25	18	140	58
Corer	30	00	146	00
Islands in East India.				
John de Lisbon	25	52	75	52
South end of St. Lawrence	24	53	68	00
North end of St. Lawrence	11	00	73	00
Mayotta	12	00	66	30
St. Hermans	09	00	84	00
Diego Gratiosa	08	00	93	20
The N. W. point of Sumatra	05	30	116	00
The S. E. end of Sumatra	05	52	123	40

A Table of Latitude and Longitude

M. M. D.		D. M. D. M.	
00	Cape Spitzel	33	38 11 39
00	Cape Cazen	32	27 07 35
00	Cape Beladar	32	35 02 34
00	Cape Blanco	30	32 35 36
00	Cape Verde	14	36 38 30
00	Sine Lave	00	00 00 32
00	Cape de Palmas	00	10 10 00
00	Cape de Palmas	00	06 16 00
00	The North Point of Fernando	00	12 27 25
00	Island St. Thomas	00	10 27 30
00	Cape Lopez	01	30 27 40
00	Cape Negro	14	30 06 50
00	Cape Espérance	34	34 38 10
00	The West side of Corva	40	00 45 30
00	The West side of Flores	39	40 34 30
00	The Road before Fial	38	30 47 47
00	The West end of Pico	38	40 48 18
00	The West end of Terceira	39	00 34 19
00	The East end of St. Michael	38	00 35 14
00	The East end of St. Marits	37	00 35 13
00	The North Part of Ferro	27	40 35 35
00	The East end of Palma	28	36 35 43
00	Pico Teneriffa	28	20 00 00
00	The East end of Madeira	32	30 00 10
00	The East end of Port. Saule	32	00 01 00
00	The N. E. of Cavaria	28	10 01 00
00	The N. E. of Fortventura	28	20 02 50
00	The East Part of Lancivotta	28	20 03 10

A Table of Latitude and Longitude

Islands in the East Indies. Sea Coasts and Isles of America, South Sea.

	D.	M.	D.	M.
Batavia	06	51	136	30
Batavia	06	51	127	09
Floris	08	50	140	48
Ambony	03	43	147	29
South end of Celebes	03	43	130	30
North Point of Celebes	02	15	148	08
South point of Borneo	03	51	138	04
North point of Borneo	07	14	154	39
South end of Lucon	05	43	145	45
North end of Lucon	08	43	141	50
South end of Formosa	01	20	142	08
North end of Formosa	06	10	143	18
West end of Japan	03	00	150	00
North point of Japan	00	05	163	00
Straights of Andam	07	10	151	30
Cape Blanco	02	00	245	00
Sir Francis Drake's Bay	38	16	246	30
Cape St. Lucas	09	30	266	00
Gulf of Salina	10	40	282	30
Cape de Passes	00	00	291	30
Tuxilla	08	20	295	00
Island Fernando	33	24	298	20
Port St. Cyprian	48	26	298	00
West entrance of Magellan	53	50	298	40
Cape Horn	57	54	303	00
Honder Islands	14	20	337	30
Prince Williams Islands	18	54	204	30
Stato Islands	38	50	193	00
Green Islands	04	50	179	00
Islands de Ladrones	10	00	170	00
Barbadoes Isles	07	00	195	05
Hermans Isles	15	10	181	09

A Table of Latitude and Longitude.

	D.	M.	D.	M.
<i>Leandre Straits</i>	55	30	310	16
<i>East entrance of Magellane</i>	52	30	305	00
<i>Cape Blanco</i>	47	50	309	49
<i>Cape St. Antonio</i>	35	30	325	00
<i>Cape St. Maria</i>	35	30	325	40
<i>Cape Prio</i>	22	50	338	30
<i>Baia de Todas Santas</i>	15	00	345	30
<i>Cape St. Augustine</i>	08	40	345	40
<i>River of Espere</i>	04	00	328	05
<i>Spring</i>	09	05	323	40
<i>Cape Roxo</i>	22	40	275	26
<i>La Florida</i>	29	31	272	16
<i>Cape Fair</i>	34	00	298	25
<i>Cape Henry</i>	37	00	300	40
<i>Cape Cod</i>	42	20	308	40
<i>Cape Race</i>	46	36	328	30
<i>Cape Rosa Viba</i>	49	19	328	36
<i>Bermudas</i>	32	18	310	50
<i>Sabana</i>	27	37	295	20
<i>Angilla</i>	18	48	313	35
<i>St. Christophers</i>	17	30	313	30
<i>Antigua</i>	16	32	315	10
<i>Martinsco</i>	14	30	316	36
<i>Barbados</i>	13	12	319	40
<i>Jurvis</i>	17	00	314	00
<i>Montserrat</i>	16	00	314	20
<i>East end of Hispaniola</i>	18	47	308	10
<i>West end of Hispaniola</i>	18	25	300	10
<i>Port Royal in Jamaica</i>	18	15	287	10
<i>East end of Cuba</i>	20	27	301	20
<i>West end of Cuba</i>	22	00	288	26
<i>Great Caiman</i>	19	21	293	30

The Main of America

The Sea Coasts of

Islands in the West Indies.

A Table of Latitude and Longitude.

The Sea-Coasts of		The Northern Parts of America.		D. M. D. M.	
Cape Canas	33	14	26	53	
Resolution Isles	61	00	30	00	
Queen Ann's Foreland	63	52	29	40	
Cape Charles	69	45	29	14	
Prince Rupert's River	81	00	18	21	
Cape Henrietta	85	11	6	27	10
Port Nelson	88	50	26	7	50
Cape Southampton	92	30	27	2	
Sea-bird Point	94	40	22	20	
St. Dunley Dig's Cape	97	10	26	0	
Cape Walsingham	98	22	00	02	
Cape Comfort	99	15	00	11	
Cape Disolation	100	50	00	02	
Cape Farewell	101	01	10	12	

[illegible]

The First Year after Leap Year.

Sun's Declination 1701, 1705, 1709, 1713.

Days.	January.	February	March.	April.	May.	June.
	South.	South.	South.	North.	North.	North.
1	21 40	23 40	03 16	08 43	18 09	23 12
2	21 30	23 19	02 53	09 04	18 24	23 16
3	21 19	22 59	02 29	09 26	18 39	23 19
4	21 08	22 38	02 05	09 47	18 53	23 22
5	20 57	22 18	01 42	10 09	19 07	23 24
6	20 45	21 57	01 18	10 30	19 21	23 26
7	20 33	21 36	00 55	10 51	19 35	23 28
8	20 20	21 14	00 31	11 12	19 48	23 29
9	20 07	20 53	00 07	11 32	20 00	23 30
10	19 54	20 31	Nor 16	11 52	20 12	23 30
11	19 40	20 09	00 40	12 13	20 25	23 30
12	19 20	09 47	01 03	12 33	20 36	23 29
13	19 12	09 25	01 27	12 53	20 48	23 29
14	18 57	09 03	01 51	13 13	20 59	23 27
15	18 42	08 40	02 14	13 32	21 09	23 26
16	18 27	08 18	02 38	13 51	21 20	23 23
17	18 11	07 55	03 01	14 10	21 30	23 21
18	17 55	07 32	03 25	14 29	21 39	23 18
19	17 38	07 10	03 48	14 48	21 48	23 15
20	17 22	06 47	04 11	15 06	21 57	23 11
21	17 05	06 24	04 34	15 24	22 05	23 07
22	16 48	06 00	04 58	15 42	22 13	23 02
23	16 30	05 37	05 20	15 59	22 21	22 57
24	16 12	05 14	05 43	16 16	22 28	22 52
25	15 54	04 50	06 06	16 34	22 35	22 46
26	15 36	04 27	06 29	16 50	22 42	22 40
27	15 17	04 04	06 51	17 07	22 48	22 33
28	14 58	03 40	07 14	17 23	22 53	22 26
29	14 38		07 36	17 38	22 59	22 19
30	14 19		07 58	17 54	23 03	22 11
31	13 59		08 02		23 08	

The Second Year after Leap Year.

Sun's Declination 1702, 1706, 1710, 1712.

	January		February		March		April		May		June	
	South		South		South		North		North		North	
01	21	42	13	45	03	22	08	38	18	06	22	17
02	21	32	13	34	02	59	08	59	18	30	22	19
03	21	22	13	04	02	35	09	21	18	35	22	18
04	21	11	12	43	02	11	09	42	18	50	22	21
05	21	00	12	23	01	48	10	04	10	04	22	24
06	20	48	12	02	01	24	10	33	19	18	22	26
07	20	30	11	41	01	00	10	46	19	31	22	27
08	20	23	11	19	00	37	11	07	19	45	22	29
09	20	10	10	58	00	13	11	28	19	57	22	29
10	19	38	10	36	Nov	11	11	48	20	10	22	30
11	19	44	10	15	00	34	12	08	20	23	22	31
12	19	30	09	53	00	58	12	28	20	34	22	30
13	19	16	09	30	01	21	12	48	20	45	22	29
14	19	01	09	08	01	45	13	08	20	56	22	29
15	18	46	08	46	02	09	13	27	21	07	22	27
16	18	31	08	23	02	32	13	47	21	17	22	24
17	18	15	08	01	02	55	14	06	21	27	22	22
18	17	59	07	38	03	19	14	25	21	37	22	20
19	17	43	07	15	03	42	14	43	21	46	22	15
20	17	26	06	52	04	05	15	08	21	55	22	12
21	17	09	06	29	04	29	15	19	22	03	22	08
22	16	52	06	06	04	52	15	37	22	11	22	03
23	16	34	05	43	05	15	15	55	22	19	22	08
24	16	16	05	20	05	38	16	12	22	27	22	03
25	15	58	04	56	06	00	16	29	22	33	22	07
26	15	40	04	33	06	23	16	46	22	40	22	01
27	15	22	04	09	06	46	17	03	22	46	22	05
28	15	02	03	45	07	09	17	19	22	52	22	08
29	14	43	02	22	07	31	17	33	22	57	22	01
30	14	24	02	01	07	59	17	59	22	02	22	03
31	14	04	02	01	08	15	17	30	22	07	22	15

The First Year after Leap-Year.

Sun's Declination 1705, 1709, 1713, 1717.

	July.		Augst.		Septem.		October.		November.		Decem.	
	North.		North.		North.		South.		South.		South.	
1	22	03	13	04	04	14	07	24	17	45	23	00
2	21	55	14	45	03	51	07	47	18	01	23	18
3	21	46	14	27	03	28	08	09	18	17	23	17
4	21	37	14	08	03	05	08	31	18	53	23	20
5	21	27	13	49	02	42	08	54	18	48	23	23
6	21	17	13	30	02	19	0	16	19	03	23	25
7	21	07	13	11	01	55	09	38	19	27	23	27
8	20	46	12	52	01	31	10	00	19	32	23	29
9	20	35	12	32	01	08	10	21	19	46	23	29
10	20	34	12	12	00	45	10	43	19	59	23	30
11	20	22	11	52	00	21	11	04	20	12	23	30
12	20	10	11	31	00	02	11	25	20	25	23	30
13	19	57	11	11	Sou.	26	11	47	20	37	23	31
14	19	45	10	50	00	49	12	07	20	49	23	37
15	19	32	10	29	01	13	12	28	21	01	23	35
16	19	18	10	08	01	36	12	49	21	12	23	33
17	19	05	09	47	01	59	13	09	21	23	23	31
18	18	50	09	26	02	23	13	29	21	33	23	37
19	18	36	09	04	02	46	13	49	21	43	23	33
20	18	21	08	43	03	10	14	09	21	53	23	38
21	18	07	08	21	03	34	14	28	22	02	23	34
22	17	51	07	59	03	56	14	47	22	10	22	39
23	17	36	07	37	04	20	15	07	22	19	22	33
24	17	20	07	15	04	43	15	28	22	26	22	47
25	17	04	06	53	05	06	15	43	22	34	22	40
26	16	48	06	31	05	29	16	02	22	42	22	33
27	16	31	06	08	05	52	16	10	22	47	22	26
28	16	14	05	45	06	18	16	38	22	53	22	18
29	15	57	05	22	06	38	16	55	22	59	22	10
30	15	39	05	00	07	01	17	12	23	04	22	01
31	15	22	04	37			17	29			22	52

The Second Year after Leap-Year.

Sun's Declination 1706, 1710, 1714, 1718.

Days.	July. North.	Augst. North.	Septem. North.	October. South.	Novemb. South.	Decem. South.
1	22 05	15 08	04 19	07 18	17 41	23 08
2	21 57	14 56	03 57	07 41	17 57	23 13
3	21 48	14 32	03 33	08 04	18 13	23 16
4	21 39	14 13	03 10	08 26	18 29	23 19
5	21 29	13 54	02 47	08 48	18 44	23 22
6	21 19	13 35	02 24	09 10	18 59	23 25
7	21 09	13 16	02 01	09 32	19 14	23 27
8	20 59	12 56	01 27	09 54	19 28	23 28
9	20 48	12 37	01 13	10 16	19 42	23 29
10	20 36	12 17	00 50	10 38	19 56	23 30
11	20 25	11 57	00 27	10 59	20 09	23 30
12	20 13	11 36	00 04	11 20	20 22	23 30
13	20 00	11 16	Sou. 20	11 42	20 34	23 29
14	19 47	10 55	00 43	12 03	20 40	23 27
15	19 34	10 34	01 07	12 23	20 58	23 26
16	19 21	10 13	01 30	12 44	21 09	23 23
17	19 07	09 52	01 54	13 04	21 20	23 21
18	18 53	09 31	02 17	13 24	21 31	23 17
19	18 39	09 10	02 41	13 44	21 41	23 14
20	18 24	08 48	03 04	14 04	21 50	23 10
21	18 09	08 26	03 27	14 24	21 59	23 05
22	17 54	08 05	03 51	14 42	22 08	23 00
23	17 39	07 43	04 14	15 02	22 17	22 54
24	17 23	07 20	04 38	15 20	22 25	22 48
25	17 07	06 58	05 01	15 39	22 32	22 42
26	16 51	06 36	05 24	15 58	22 39	22 35
27	16 35	06 13	05 47	16 15	22 46	22 28
28	16 18	05 51	06 10	16 33	22 52	22 20
29	16 01	05 28	06 33	16 50	22 57	22 13
30	15 43	05 05	06 59	17 08	23 03	22 03
31	15 26	04 42		17 25		21 54

The Third Year after Leap-Year.

Sun's Declination 1703, 1707, 1711, 1715.

Day.	January.		February		March.		April.		May.		June.	
	South.		South.		South.		North.		North.		North.	
1	21	45	13	50	03	29	08	32	18	02	23	10
2	21	35	13	29	03	04	08	54	18	17	23	14
3	21	24	13	09	02	41	09	16	18	32	23	17
4	21	13	12	48	02	17	09	37	18	46	23	21
5	21	02	12	28	01	54	09	59	19	01	23	23
6	20	50	12	07	01	30	10	20	19	14	23	25
7	20	38	11	46	01	06	10	41	19	28	23	27
8	20	26	11	25	00	43	11	22	19	41	23	28
9	20	14	11	03	00	19	11	23	19	54	23	29
10	20	01	10	42	Nor	04	11	43	20	07	23	30
11	19	47	10	20	00	28	12	03	20	20	23	30
12	19	33	09	58	00	52	12	23	20	31	23	30
13	19	19	09	36	01	16	12	43	20	42	23	39
14	19	05	09	14	01	40	13	03	20	53	23	28
15	18	50	08	51	02	03	13	23	21	04	23	26
16	18	34	08	28	02	27	13	42	21	15	23	24
17	18	19	08	06	02	50	14	01	21	25	23	22
18	18	03	07	43	03	13	14	20	21	35	23	12
19	17	47	07	21	03	37	14	39	21	44	23	19
20	17	30	06	58	04	00	14	57	21	53	23	16
21	17	13	06	35	04	23	15	15	22	02	23	13
22	16	56	06	12	04	40	15	33	22	10	23	09
23	16	38	05	49	05	06	15	51	22	17	23	04
24	16	21	05	25	05	32	16	08	22	25	23	00
25	16	03	05	02	05	55	16	25	22	32	22	54
26	15	44	04	39	06	18	16	42	22	39	22	49
27	15	26	04	15	06	41	16	59	22	45	22	43
28	15	07	03	52	07	03	17	15	22	51	22	30
29	14	48			07	25	17	31	22	56	22	30
30	14	28			07	48	17	47	23	01	22	23
31	14	09			08	15			23	06	22	15

The Third Year after Leap Year.

Sun's Declination 1707, 1711, 1715, 1719.

Day	July.		August.		Septem.		October.		Novemb.		Decemb.	
	North.		North.		North.		South.		South.		South.	
1	22	07	15	13	04	26	07	13	17	37	23	06
2	21	59	14	54	04	03	07	35	17	53	23	11
3	21	50	14	36	03	39	07	58	18	09	23	15
4	21	41	14	18	03	16	08	20	18	25	23	18
5	21	32	13	59	02	53	08	43	18	41	23	21
6	21	22	13	40	02	29	09	05	18	56	23	24
7	21	12	13	21	02	06	09	27	19	10	23	26
8	21	01	13	01	01	43	09	50	19	35	23	28
9	20	50	12	41	01	19	10	11	19	39	23	29
10	20	39	12	22	00	56	10	33	19	52	23	30
11	20	28	12	02	00	33	10	54	20	06	23	30
12	20	16	11	41	00	09	11	15	20	19	23	30
13	20	03	11	22	Sou.	14	11	36	20	31	23	29
14	19	51	11	03	00	37	11	57	20	43	23	27
15	19	38	10	39	01	01	12	18	20	55	23	26
16	19	25	10	19	01	24	12	39	21	06	23	24
17	19	11	09	57	01	48	12	59	21	17	23	21
18	18	57	09	36	02	11	13	20	21	28	23	18
19	18	43	08	15	02	35	13	40	21	38	23	15
20	18	29	08	53	02	58	13	59	21	48	23	11
21	18	14	08	32	03	22	14	19	21	57	23	06
22	17	59	08	10	03	45	14	38	22	06	23	01
23	17	43	07	48	04	08	14	58	22	15	22	56
24	17	28	07	26	04	32	15	17	22	23	22	50
25	17	12	07	04	04	55	15	35	22	30	22	44
26	16	55	06	41	05	18	15	53	22	37	22	37
27	16	39	06	19	05	41	16	11	22	44	22	30
28	16	22	05	56	06	04	16	29	22	50	22	22
29	16	05	05	33	06	27	16	46	22	56	22	41
30	15	48	05	11	06	51	17	04	23	02	22	05
31	15	30	04	48			17	20			21	56

Leap Year.

Sun's Declination 1704, 1708, 1712 1716.

Day.	January.		February.		March.		April.		May.		June.	
	South.		South.		South.		North.		North.		North.	
1	21	47	13	54	03	10	08	48	18	14	23	14
2	21	37	13	34	02	46	09	10	18	28	23	17
3	21	27	13	14	02	23	09	32	18	43	23	20
4	21	16	12	53	01	59	09	53	18	57	23	22
5	21	07	12	33	01	36	10	15	19	13	23	25
6	20	54	12	12	01	12	10	36	19	25	23	27
7	20	42	11	51	00	48	10	57	19	38	23	28
8	20	30	11	30	00	24	11	17	19	51	23	29
9	20	17	11	09	00	01	11	38	20	04	23	30
10	20	04	10	47	Nor.	23	11	58	20	16	23	30
11	19	50	10	25	00	46	12	18	20	28	23	30
12	19	37	10	03	01	10	12	39	20	39	23	29
13	19	23	09	41	01	34	12	48	20	51	23	28
14	19	08	09	19	01	58	13	18	21	02	23	27
15	18	53	08	57	02	21	13	37	21	12	23	25
16	18	38	08	34	02	44	13	56	21	22	23	23
17	18	22	08	12	03	08	14	15	21	32	23	20
18	18	07	07	49	03	31	14	34	21	42	23	17
19	17	51	07	26	03	54	14	53	21	51	23	14
20	17	34	07	04	04	18	15	11	21	59	23	10
21	17	17	06	41	04	41	15	29	22	08	23	05
22	17	00	06	17	05	04	15	47	22	16	23	01
23	16	43	05	54	05	27	16	04	22	23	22	56
24	16	25	05	31	05	50	16	21	22	30	22	50
25	16	07	05	08	06	12	16	36	22	37	22	44
26	15	49	04	44	06	35	16	54	22	43	22	38
27	15	30	04	21	06	57	17	11	22	49	22	31
28	15	11	03	57	07	20	17	27	22	55	22	24
29	14	53	03	34	07	42	17	43	23	00	22	17
30	14	33			08	04	17	58	23	05	22	09
31	14	14			08	26			23	09		

Leap Year.

Sun's Declination 1708, 1712, 1716, 1720.

Days.	July.		August.		Septem.		October.		Novemb.		Decemb.	
	North.		North.		North.		South.		South.		South.	
1	22	01	14	59	04	09	07	30	17	49	23	10
2	21	52	14	41	03	45	07	53	18	06	23	14
3	21	43	14	23	03	22	08	15	18	21	23	18
4	21	34	14	04	03	58	08	37	18	37	23	21
5	21	24	13	44	02	35	09	00	18	52	23	24
6	21	14	13	25	02	12	09	22	19	07	23	26
7	21	04	13	05	01	48	09	44	19	21	23	28
8	20	53	12	46	01	25	10	05	19	36	23	29
9	20	42	12	26	01	02	10	27	19	49	23	30
10	20	30	12	06	00	39	10	49	20	02	23	30
11	20	19	11	46	00	15	11	10	20	15	23	30
12	20	07	11	26	Sou. 08		11	31	20	28	23	28
13	19	54	11	06	00	32	11	52	20	40	23	29
14	19	41	10	45	00	55	12	13	20	52	23	27
15	19	28	10	24	01	19	12	34	21	04	23	25
16	19	14	10	03	01	42	12	54	21	15	23	22
17	19	01	09	41	02	06	13	15	21	25	23	19
18	18	46	09	20	02	29	13	35	21	36	23	16
19	18	32	08	59	02	53	13	54	21	46	23	12
20	18	17	08	37	03	16	14	14	21	55	23	07
21	18	02	08	15	03	39	14	34	22	04	23	02
22	17	47	07	53	04	03	14	53	22	13	22	57
23	17	31	07	31	04	26	15	12	22	21	22	51
24	17	16	07	09	04	49	15	31	22	28	22	45
25	16	59	06	47	05	13	15	49	22	36	22	39
26	16	43	06	24	05	35	16	07	22	43	22	31
27	16	26	06	02	05	59	16	25	22	49	22	24
28	16	09	05	39	06	22	16	42	22	55	22	16
29	15	52	05	16	06	45	17	00	23	00	21	07
30	15	34	04	54	07	08	17	16	23	05	21	59
31	15	17	04	32			17	33		21	49	

A Table of Diff. of Lat. and Departure.												
Distance.	$\frac{1}{4}$ Point.		$\frac{1}{2}$ Point.		$\frac{3}{4}$ Point.		1 Point.					
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.
1	00	0	1	00	1	00	1	00	2	1		
2	00	1	2	00	2	00	3	2	00	4	2	
3	00	1	3	00	3	00	4	2	90	6	3	
4	00	2	4	00	4	00	6	3	90	8	4	
5	00	2	5	00	5	00	7	4	91	0	5	
6	00	3	6	00	6	00	8	5	91	2	6	
7	00	3	7	00	7	00	9	6	91	4	7	
8	00	4	8	00	8	00	2	7	81	6	8	
9	00	4	9	00	9	00	3	8	81	8	9	
10	00	5	10	01	0	9	91	5	9	82	0	10
11	00	5	10	91	1	10	91	6	10	82	1	11
12	00	6	11	91	2	11	91	8	11	82	3	12
13	00	6	12	91	3	12	91	9	12	82	5	13
14	00	7	13	91	4	13	92	0	13	72	7	14
15	00	7	14	91	5	14	92	2	14	72	9	15
16	00	8	15	91	6	15	92	3	15	73	1	16
17	00	8	16	91	7	16	92	5	16	73	3	17
18	00	9	17	91	8	17	82	6	17	73	5	18
19	00	9	18	91	9	18	82	8	18	63	7	19
20	01	0	19	92	0	19	82	9	19	63	9	20
21	01	0	20	92	1	20	83	1	20	64	1	21
22	01	1	21	92	2	21	83	2	21	64	3	22
23	01	1	22	92	3	22	83	4	22	64	5	23
24	01	2	23	92	4	23	83	5	23	64	7	24
25	01	2	24	92	5	24	83	7	24	54	9	25
26	01	3	25	92	6	25	73	8	25	55	1	26
27	01	3	26	92	7	26	74	0	26	55	3	27
28	01	4	27	92	8	27	74	1	27	55	5	28
29	01	4	28	92	9	28	74	3	28	45	7	29
30	01	5	29	92	9	29	74	4	29	45	8	30
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.		
	$7\frac{1}{4}$ Points.		$7\frac{1}{2}$ Points.		$7\frac{3}{4}$ Points.		7 Points.					

A Table of Diff. of Lat. and Departure.											
Distance.	$\frac{1}{4}$ Point.		$\frac{1}{2}$ Point.		$\frac{3}{4}$ Point.		1 Point.		Distance.		
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.		Lat.	Dep.
31	31 01	5	30 83	0	30 74	6	30 46	0	31		
32	32 01	6	31 83	1	31 74	7	31 46	2	32		
33	33 01	6	32 83	2	32 74	9	32 46	4	33		
34	34 01	7	33 83	3	33 75	0	33 36	6	34		
35	35 01	7	34 83	4	34 65	2	34 36	8	35		
36	36 01	8	35 83	5	35 65	3	35 37	0	36		
37	37 01	8	36 83	6	36 65	5	36 37	2	37		
38	38 01	9	37 83	7	37 65	6	37 37	4	38		
39	39 01	9	38 83	8	38 65	8	38 37	6	39		
40	40 02	0	39 83	9	39 65	9	39 27	8	40		
41	40 92	0	40 84	0	40 66	1	40 28	0	41		
42	41 92	1	41 84	1	41 66	2	41 28	2	42		
43	42 92	1	42 84	2	42 56	4	42 28	4	43		
44	43 92	2	43 84	3	43 56	5	43 28	6	44		
45	44 92	2	44 84	4	44 56	7	44 18	8	45		
46	45 92	3	45 84	5	45 56	8	45 19	0	46		
47	46 92	3	46 84	6	46 57	0	46 19	2	47		
48	47 92	4	47 84	7	47 57	1	47 19	4	48		
49	48 92	4	48 84	8	48 57	2	48 19	6	49		
50	49 92	5	49 84	9	49 57	3	49 09	8	50		
51	50 92	5	50 75	0	50 47	5	50 09	9	51		
52	51 92	5	51 75	1	51 47	6	51 010	1	52		
53	52 92	6	52 75	2	52 47	8	52 010	3	53		
54	53 92	6	53 75	3	53 47	9	53 010	5	54		
55	54 92	7	54 75	4	54 48	1	53 910	7	55		
56	55 92	7	55 75	5	55 48	4	54 910	9	56		
57	56 92	8	56 75	6	56 48	4	55 911	1	57		
58	57 92	8	57 75	7	57 48	5	56 911	3	58		
59	58 92	9	58 75	8	58 38	6	57 911	5	59		
60	59 92	9	59 75	9	59 38	8	58 811	7	60		
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.			
	7 $\frac{1}{4}$ Points.		7 $\frac{1}{2}$ Points.		7 $\frac{3}{4}$ Points.		7 Points.				

A Table of Diff. of Lat. and Departure.												
Distance.	1 $\frac{1}{4}$ Point.			1 $\frac{1}{2}$ Point.			1 $\frac{3}{4}$ Point.			2 Point.		Distance.
	Lat.	Dep.		Lat.	Dep.		Lat.	Dep.		Lat.	Dep.	
1	1 00	2		1 00	3		0 90	3		0 90	4	1
2	1 90	5		1 90	6		1 90	7		1 80	8	2
3	2 90	7		2 90	9		2 81	0		2 81	1	3
4	3 91	0		3 81	2		3 81	3		3 71	5	4
5	4 81	2		4 81	5		4 71	7		4 61	9	5
6	5 81	4		5 71	7		5 62	0		5 52	3	6
7	6 81	7		6 72	0		6 62	4		6 52	7	7
8	7 81	9		7 62	3		7 62	7		7 42	1	8
9	8 72	2		8 62	6		8 53	0		8 33	4	9
10	9 72	4		9 62	9		9 43	4		9 23	8	10
11	10 72	7		10 53	2		10 33	7		10 24	2	11
12	11 62	9		11 53	5		11 34	0		11 14	6	12
13	12 63	1		12 43	8		12 24	4		12 05	0	13
14	13 63	4		13 44	1		13 24	8		13 05	4	14
15	14 63	6		14 34	4		14 15	1		13 95	8	15
16	15 53	9		15 34	7		15 05	4		14 86	1	16
17	16 54	1		16 25	0		16 05	7		15 76	5	17
18	17 54	4		17 25	2		16 96	0		16 76	9	18
19	18 44	6		18 25	5		17 96	4		17 67	2	19
20	19 44	8		19 15	8		18 86	7		18 57	6	20
21	20 45	0		20 16	1		19 77	0		19 58	0	21
22	21 35	3		21 06	4		20 77	4		20 48	4	22
23	22 35	6		22 06	7		21 67	7		21 38	8	23
24	23 35	8		23 07	0		22 68	0		22 29	1	24
25	24 26	0		23 97	3		23 58	4		23 19	5	25
26	25 26	3		24 97	6		24 48	7		24 09	9	26
27	26 26	5		25 87	9		25 49	0		25 010	3	27
28	27 26	8		26 88	2		26 39	4		25 910	7	28
29	28 17	0		27 78	5		27 29	7		26 811	1	29
30	29 17	3		28 78	7		28 210	1		27 711	2	30
Dep. Lat.			Dep. Lat.			Dep. Lat.			Dep. Lat.			
6 $\frac{1}{4}$ Points.			6 $\frac{1}{2}$ Points.			6 $\frac{3}{4}$ Points.			6 Points.			

A Table of Diff. of Lat. and Departur e

Distance.	1 $\frac{1}{2}$ Point.		1 $\frac{1}{2}$ Point.		1 $\frac{3}{4}$ Point.		2 Point.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
31	30 17	5	29 69	0	29 110 4	28 6 11 9	31		31
32	31 07	7	30 69	2	30 110 8	29 5 12 3	32		32
33	32 08	0	31 69	5	31 0 11 1	30 5 12 7	33		33
34	33 08	2	32 59	8	31 9 11 4	31 4 13 1	34		34
35	34 08	5	33 5 10	1	32 9 11 8	32 3 13 5	35		35
36	34 9 8	7	34 4 10	4	33 8 12 1	33 2 13 8	36		36
37	35 9 9	0	35 4 10	7	34 8 12 4	34 1 14 8	37		37
38	36 9 9	2	36 3 11	0	35 7 12 8	35 0 14 6	38		38
39	37 8 9	4	37 3 11	3	36 7 13 1	36 0 15 0	39		39
40	38 8 9	7	38 3 11	6	37 7 13 5	36 9 15 3	40		40
41	39 8 9	9	39 2 11	9	38 6 13 8	37 8 15 7	41		41
42	40 7 10	2	40 2 12	2	39 6 14 5	38 7 16 1	42		42
43	41 7 10	4	41 1 12	5	40 5 14 1	39 6 16 5	43		43
44	42 7 10	7	42 1 12	8	41 4 14 8	40 6 16 9	44		44
45	43 7 10	9	43 0 13	0	42 4 15 1	41 5 17 2	45		45
46	44 6 11	1	44 0 13	3	43 3 15 5	42 4 17 6	46		46
47	45 6 11	4	44 9 13	6	44 3 15 8	43 4 18 0	47		47
48	46 6 11	6	45 9 13	9	45 2 16 1	44 3 18 4	48		48
49	47 5 11	9	46 9 14	2	46 2 16 5	45 2 18 8	49		49
50	48 5 12	1	47 8 14	5	47 1 16 8	46 2 19 1	50		50
51	49 5 12	3	48 8 14	8	48 0 17 1	47 1 19 5	51		51
52	50 4 12	6	49 7 15	1	49 0 17 5	48 0 19 9	52		52
53	51 4 12	8	50 7 15	4	49 9 17 9	49 0 20 2	53		53
54	52 4 13	1	51 6 15	7	50 8 18 2	49 9 20 6	54		54
55	53 4 13	3	52 6 16	0	51 8 18 5	50 8 21 0	55		55
56	54 3 13	6	53 5 16	3	52 7 18 9	51 8 21 4	56		56
57	55 3 13	8	54 5 16	6	53 7 19 2	52 7 21 8	57		57
58	56 3 13	0	55 4 16	9	54 6 19 5	53 6 22 2	58		58
59	57 2 14	3	56 4 17	1	55 6 19 9	54 5 22 6	59		59
60	58 2 14	5	57 4 17	4	56 5 20 2	55 4 23 0	60		60
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	
	6 $\frac{1}{2}$ Points.		6 $\frac{1}{2}$ Points.		6 $\frac{1}{2}$ Points.		6 Points.		

A Table of Diff. of Lat. and Depar.

Distance.	2 $\frac{1}{4}$ Points.			2 $\frac{1}{2}$ Points.			2 $\frac{3}{4}$ Points.			3 Points.			Distance.
	Lat.	Dep.		Lat.	Dep.		Lat.	Dep.		Lat.	Dep.		
1	0	90	4	0	90	5	0	90	5	0	80	6	1
2	1	80	9	1	80	9	1	71	0	1	71	1	2
3	2	71	3	2	61	4	2	61	5	2	51	7	3
4	3	61	7	3	51	9	3	42	1	3	32	2	4
5	4	52	1	4	42	4	4	32	6	4	22	8	5
6	5	42	6	5	32	8	5	13	1	5	03	3	6
7	6	33	0	6	23	3	6	03	6	5	83	9	7
8	7	23	4	7	03	8	6	94	1	6	74	4	8
9	8	13	8	7	94	2	7	74	6	7	55	0	9
10	9	04	3	8	84	7	8	65	1	8	35	6	10
11	9	94	7	9	75	2	9	45	6	9	26	1	11
12	10	85	1	10	65	6	10	36	2	10	06	7	12
13	11	75	6	11	56	1	11	16	7	10	87	2	13
14	12	66	0	12	46	5	12	07	2	11	77	8	14
15	13	56	4	13	37	0	12	97	7	12	58	3	15
16	14	56	9	14	17	5	13	78	2	13	38	9	16
17	15	47	3	15	07	9	14	68	7	14	29	4	17
18	16	37	7	15	98	4	15	49	2	15	01	0	18
19	17	28	1	16	88	9	16	39	7	15	81	6	19
20	18	18	6	17	69	4	17	110	3	16	61	1	20
21	19	09	0	18	59	8	18	010	8	17	51	7	21
22	19	99	4	19	410	3	18	911	3	18	312	2	22
23	20	89	8	20	310	8	19	711	8	19	212	8	23
24	21	710	3	21	211	2	20	612	3	20	013	3	24
25	22	610	7	22	111	7	21	412	8	20	813	9	25
26	23	511	1	23	012	2	22	313	3	21	714	4	26
27	24	411	6	23	812	6	23	113	8	22	515	0	27
28	25	312	0	24	713	1	24	014	3	23	315	6	28
29	26	212	4	25	613	6	24	914	8	24	116	1	29
30	27	112	8	26	514	1	25	715	4	24	916	7	30
	Dep.	Lat.		Dep.	Lat.		Dep.	Lat.		Dep.	Lat.		
	5 $\frac{3}{4}$ Points.			5 $\frac{1}{2}$ Points.			5 $\frac{1}{4}$ Points.			5 Points.			

A Table of Diff. of Lat. and Departure.

Distance	2 $\frac{1}{4}$ Points.		2 $\frac{1}{2}$ Points.		2 $\frac{3}{4}$ Points.		3 Points.		Distance
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
31	28 0	13 3	27 4	14 5	26 6	15 9	25 7	17 3	31
32	28 9	13 7	28 2	15 0	27 4	16 4	26 5	17 8	32
33	29 8	14 1	29 1	15 5	28 3	16 9	27 3	18 3	33
34	30 7	14 6	30 0	15 9	29 1	17 4	28 2	18 9	34
35	31 6	15 0	30 9	16 4	30 0	17 9	29 1	19 4	35
36	32 5	15 4	31 8	16 9	30 9	18 5	29 9	20 0	36
37	33 4	15 8	32 6	17 4	31 7	19 0	30 8	20 6	37
38	34 3	16 3	33 5	17 9	32 6	19 5	31 6	21 1	38
39	35 2	16 7	34 4	18 4	33 4	20 1	32 4	21 7	39
40	36 1	17 1	35 3	18 9	34 3	20 6	33 3	22 2	40
41	37 0	17 6	36 2	19 3	35 1	21 1	34 1	22 8	41
42	37 9	18 0	37 1	19 8	36 0	21 6	34 9	23 3	42
43	38 8	18 4	38 0	20 3	36 9	22 1	35 8	23 9	43
44	39 7	18 9	38 8	20 8	37 7	22 6	36 6	24 4	44
45	40 6	19 3	39 7	21 2	38 6	23 1	37 4	25 0	45
46	41 6	19 7	40 6	21 7	39 4	23 6	38 3	25 6	46
47	42 5	20 1	41 5	22 2	40 3	24 1	39 1	26 1	47
48	43 4	20 6	42 4	22 7	41 1	24 7	39 9	26 7	48
49	44 3	21 0	43 2	23 2	42 0	25 2	40 8	27 2	49
50	45 2	21 4	44 1	23 6	42 9	25 7	41 6	27 8	50
51	46 1	21 8	45 0	24 1	43 7	26 2	42 4	28 3	51
52	47 0	22 3	45 9	24 5	44 6	26 7	43 3	28 9	52
53	47 9	22 7	46 8	24 9	45 4	27 2	44 1	29 4	53
54	48 8	23 1	47 7	25 4	46 3	27 7	44 9	30 0	54
55	49 7	23 6	48 5	25 9	47 1	28 3	45 7	30 6	55
56	50 6	24 0	49 4	26 4	48 0	28 8	46 6	31 1	56
57	51 5	24 4	50 3	26 8	48 9	29 3	47 4	31 7	57
58	52 4	24 8	51 2	27 3	49 7	29 8	48 3	32 2	58
59	53 3	25 2	52 0	27 8	50 6	30 3	49 1	32 8	59
60	54 2	25 6	52 9	28 3	51 5	30 8	49 9	33 3	60
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	
	5 $\frac{1}{4}$ Points.		5 $\frac{1}{2}$ Points.		5 $\frac{3}{4}$ Points.		5 Points.		

A Table of Diff. of Lat. and Departure.															
Distance.	3 $\frac{1}{4}$ Points.			3 $\frac{1}{2}$ Points.			3 $\frac{3}{4}$ Points.			4 Points.			Distance.		
	Lat.	Dep.		Lat.	Dep.		Lat.	Dep.		Lat.	Dep.				
1	0	8	0	0	8	0	0	7	0	7	0	7	1		
2	1	6	1	1	6	1	1	5	1	3	1	4	2		
3	2	4	1	2	3	1	2	2	2	0	2	1	3		
4	3	2	2	3	1	2	3	0	2	7	2	8	4		
5	4	0	3	3	9	3	3	7	3	4	3	5	5		
6	4	8	3	4	6	3	4	4	4	0	4	2	6		
7	5	6	4	5	4	4	5	2	4	7	4	9	7		
8	6	4	4	6	2	5	5	9	5	4	5	7	8		
9	7	2	5	7	0	5	6	7	6	0	6	4	9		
10	8	0	6	7	7	6	7	4	6	7	7	1	10		
11	8	8	6	8	5	6	8	1	7	4	7	8	11		
12	9	6	7	9	2	7	8	9	8	0	8	5	12		
13	10	4	7	10	0	8	9	6	8	7	9	2	13		
14	11	2	8	10	8	8	10	4	9	4	9	9	14		
15	12	0	9	11	6	9	11	1	10	0	10	6	15		
16	12	8	9	12	4	10	11	9	11	7	11	3	16		
17	13	6	10	13	2	10	12	6	11	4	12	0	17		
18	14	4	10	14	0	11	13	4	12	0	12	7	18		
19	15	2	11	14	7	12	14	1	12	7	13	4	19		
20	16	1	11	15	5	12	14	8	13	4	14	1	20		
21	16	9	12	16	3	13	15	6	14	1	14	8	21		
22	17	7	13	17	1	13	16	3	14	8	15	6	22		
23	18	5	13	17	9	14	17	1	15	5	16	3	23		
24	19	3	14	18	6	15	17	8	16	1	17	0	24		
25	20	1	14	19	4	15	18	6	16	8	17	7	25		
26	20	9	15	20	2	16	19	3	17	5	18	4	26		
27	21	7	16	21	0	17	20	1	18	1	19	1	27		
28	22	5	16	21	7	17	20	7	18	8	19	8	28		
29	23	3	17	22	5	18	21	5	19	5	20	5	29		
30	24	1	17	23	2	19	22	2	20	1	21	2	30		
Dep.		Lat.		Dep.		Lat.		Dep.		Lat.		Dep.			
4 $\frac{1}{4}$ Points.				4 $\frac{1}{2}$ Points.				4 $\frac{3}{4}$ Points.				4 Points.			

1 Table of Diff. of Lat. and Departure.

Distance	3 $\frac{1}{4}$ Points.		3 $\frac{1}{2}$ Points.		3 $\frac{3}{4}$ Points.		4 Points.		Distance
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
31	24 9	18 5	24 0	19 6	23 0	20 8	21 9	21 9	31
32	25 7	19 1	24 7	20 3	23 7	21 5	22 6	22 6	32
33	26 5	19 7	25 5	20 9	24 4	22 1	23 4	23 3	33
34	27 3	20 3	26 2	21 5	25 2	22 8	24 1	24 0	34
35	28 1	20 9	27 0	22 2	25 9	23 5	24 8	24 7	35
36	28 9	21 5	27 8	22 8	26 7	24 1	25 5	25 4	36
37	29 7	22 1	28 6	23 4	27 4	24 8	26 2	26 2	37
38	30 5	22 7	29 3	24 1	28 1	25 5	26 9	26 9	38
39	31 3	23 3	30 1	24 7	28 9	26 2	27 6	27 6	39
40	32 1	23 8	30 9	25 4	29 6	26 9	28 3	28 3	40
41	32 9	24 4	31 6	26 0	30 4	27 5	29 0	29 0	41
42	33 7	25 0	32 4	26 6	31 1	28 2	29 7	29 7	42
43	34 5	25 6	33 2	27 2	31 9	28 9	30 4	30 4	43
44	35 3	26 2	34 0	27 8	32 6	29 5	31 1	31 1	44
45	36 1	26 8	34 8	28 4	33 4	30 2	31 8	31 8	45
46	36 9	27 4	35 5	29 1	34 1	30 9	32 5	32 5	46
47	37 7	28 0	36 3	29 7	34 9	31 5	33 2	33 2	47
48	38 5	28 6	37 1	30 3	35 6	32 2	33 9	33 9	48
49	39 3	29 2	37 9	31 0	36 3	32 9	34 7	34 7	49
50	40 1	29 8	38 7	31 7	37 0	33 6	35 4	35 4	50
51	40 0	30 4	39 5	32 3	37 8	34 3	36 1	36 1	51
52	41 8	31 0	40 3	32 9	38 5	35 0	36 8	36 8	52
53	42 6	31 6	41 1	33 6	39 2	35 6	37 5	37 5	53
54	43 4	32 2	41 8	34 3	40 0	36 3	38 2	38 2	54
55	44 2	32 8	42 6	34 9	40 8	37 0	38 9	38 9	55
56	45 0	33 4	43 4	35 6	41 7	37 6	39 6	39 6	56
57	45 8	34 0	44 2	36 2	42 8	38 3	40 3	40 3	57
58	46 6	34 6	45 0	36 8	43 0	39 0	41 0	41 0	58
59	47 4	35 2	45 8	37 4	43 8	39 6	41 7	41 7	59
60	48 2	35 7	45 4	38 1	44 5	40 3	42 4	42 4	60
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	
	4 $\frac{1}{4}$ Points.		4 $\frac{1}{2}$ Points.		4 $\frac{3}{4}$ Points.		4 Points.		

The Bearing Distance and Longest Day of most of
the Principal Cities and Places in the World, from
the Famous City of L O N D O N.

Names of the Places.	Point Bearing.	Dist. Miles	Length of Day.	
			H.	M.
Alexandria in Egypt	S. E. by E.	2100	14	00
Amsterdam in Holland	E. by N.	266	16	40
Antwerp in Brabant	East <i>ferè</i>	248	16	28
Babylon	E. S. E.	2724	14	25
Barwick	North <i>ferè</i>	267	17	24
Calice in France	E. by S.	86	16	25
Calicut in East-India	S. E. by E.	5214	12	20
Constantinople	E. S. E.	1547	15	15
Dantzick	E. N. E.	961	17	08
Dublin in Ireland	N. W. b. W.	296	17	15
Edinburgh in Scotland	North	327	17	40
Florence	South-East	800	15	10
Frankford	East <i>ferè</i>	448	16	15
Hamburg	E. N. E.	538	18	00
Jerusalem	S. E. by E.	2352	12	08
Iceland	N. N. W.	930	21	44
Lisbon in Portugal	S. S. W.	985	14	45
Mentz in Germany	East	410	16	25
Mexico	W. by S.	6844	13	20
Middleburgh in Zealand	East	205	16	30
Morocco in Barbary	S. S. W.	1449	14	00
Naples	S. E. by E.	1051	14	50
Paris in France	S. S. E.	212	15	57
Prague in Bohemia	East <i>ferè</i>	700	16	15
Quinsai in China	E. by S.	7272	13	35
Rome	S. E. by E.	887	15	04
Sevil	S. by W.	950	14	40
Spire	East by S.	430	16	02
Toledo in Spain	S. by W.	934	14	36
Troy	E. S. E.	1605	15	00
Venice	E. S. E.	744	13	28
York	North <i>ferè</i>	150	17	00
L O N D O N			16	30

A Table shewing what Day of the Week the first day of March falls on; also the Epact, Dominical Letter, first Sunday in Lent, Easter-Day and Whitsunday, for 23 years.

Anno Dom.	First of March.	Epact	Sund. Lett.	Shrove Sunday.	Easter-Day.	White-Sunday.
1702	Sunday	12	D	Feb. 15	April 5	May 24
1703	Monday	23	C	Feb. 7	March 28	May 16
1704	Wednesday	4	BA	Feb. 27	April 16	June 4
1705	Thursday	15	G	Feb. 18	April 8	June 27
1706	Friday	26	F	Feb. 3	March 24	May 12
1707	Saturday	7	E	Feb. 23	April 13	June 1
1708	Monday	18	DC	Feb. 14	April 4	May 23
1709	Tuesday	29	B	March 6	April 24	May 12
1710	Wednesday	11	A	Feb. 19	April 9	May 28
1711	Thursday	22	G	Feb. 11	April 1	May 20
1712	Saturday	3	FE	Feb. 4	April 14	June 2
1713	Sunday	4	D	Feb. 26	April 6	May 25
1714	Monday	25	C	Feb. 8	March 29	May 17
1715	Tuesday	6	B	Feb. 27	April 17	June 5
1716	Thursday	17	AG	Feb. 12	April 1	May 20
1717	Friday	28	F	March 3	April 21	June 9
1718	Saturday	9	E	Feb. 23	April 13	June 1
1719	Sunday	20	D	Feb. 8	March 29	May 17
1720	Tuesday	1	CB	Feb. 28	April 17	June 5
1721	Wednesday	12	A	Feb. 19	April 9	May 28
1722	Thursday	23	G	Feb. 11	March 25	May 13
1723	Friday	4	F	Feb. 24	April 14	June 2
1724	Sunday	15	ED	Feb. 16	April 5	May 24

A Perpetual Almanack.

Days of the Month the same day of the Week as the first of March

March	1	8	15	22	29	November
August	2	9	16	23	30	August
May	3	10	17	24	31	January
October	4	11	18	25	00	October
April	5	12	19	26	00	July
September	6	13	20	27	00	December
June	7	14	21	28	00	February

A Table of the Angels which every Rhomb
(or Point of the Compass) makes with the
Meridian.

<u>NORTH</u>	<u>SOUTH</u>	<u>Ang.</u>	<u>D. M.</u>	<u>NORTH</u>	<u>SOUTH</u>
			02 49		
			05 37		
			08 26		
<u>N. by East.</u>	<u>S. by East.</u>	<u>1</u>	11 15	<u>N. by West.</u>	<u>S. by W.</u>
			14 04		
			16 52		
			19 41		
<u>N.N.E.</u>	<u>S.S.E.</u>	<u>2</u>	22 30	<u>N.N.W.</u>	<u>S.S.W.</u>
			25 19		
			28 07		
			30 56		
<u>N.E. by N.</u>	<u>S.E. by S.</u>	<u>3</u>	33 45	<u>N.W. by N.</u>	<u>S.W. by S.</u>
			36 34		
			39 22		
			42 11		
<u>North-East</u>	<u>South-East</u>	<u>4</u>	45 00	<u>Nor. West.</u>	<u>Sou. West.</u>
			47 49		
			50 37		
			53 26		
<u>N.E. by E.</u>	<u>S.E. by E.</u>	<u>5</u>	56 15	<u>N.W.b.W.</u>	<u>S.W.b.W.</u>
			59 04		
			61 52		
			64 41		
<u>E.N.E.</u>	<u>E.S.E.</u>	<u>6</u>	67 30	<u>W.N.W.</u>	<u>W.S.W.</u>
			70 19		
			73 07		
			75 56		
<u>E. by North</u>	<u>E. by South</u>	<u>7</u>	78 45	<u>W. by Nor.</u>	<u>W. by Sou.</u>
			81 34		
			84 22		
			87 11		
<u>East.</u>	<u>East.</u>	<u>8</u>	90 00	<u>West.</u>	<u>West.</u>

The Use of the foregoing Tables.

The Use of the Table of Meridional Parts.

THIS Table sheweth the Meridional parts for any Degree or Minute of Latitude. In the first Column towards the left hand, are the Degrees of Latitude, from 1 to 89 d. in the second, third, fourth, fifth, sixth and seventh Columns, are every 10 Minutes of Latitude, answering to the Degree in the first Column, and are distinguished with 0, 10, 20, 30, 40 and 50 Minutes: In the last Column towards the right-hand, are the Differences in Meridional parts to every ten Minutes of Latitude: By the help of which, and the foregoing Table of Proportional Parts, the Meridional Parts may be found to every minute of Latitude.

Example. Suppose the Latitude be 17 d. 10 m. to find the Meridional Parts.

Right against 17 d. in the first Column, and under 10 m. in the third Column, you will find the Meridional Parts to be 1046. Suppose you were to find the Meridional Parts answering to the Latitude 74 d. 30 m.

Right against 74 d. in the first Column, and under 30 m. in the seventh Column, you will find 6933, which are the Meridional Parts required.

The Use of the Table of Proportional Parts.

THE Use of this Table is to find the Meridional Parts to every minute of Latitude.

Example. Suppose it were required to find the Meridional parts for the Latitude 29 d. 17 m. First, find the Meridional Parts for the Latitude 29 d. 10 m. being the next, which is less than 17, which you will find to be 1831, and right against 29 d. in the Column of Difference you will find 113: With this Difference go to the Table of Proportional Parts, and look 11 in the first Column under D. which stands for Difference, and because 17 m. is 7 more than 10, look under 7 at the Top of the 8th Column, so right against 11 and under 7 you will find 8, which added to 1831, makes 1839, the Meridional Parts required.

Suppose you were required to find the Meridional parts for the Latitude 45 d. 36 m.

The next less than 36 m. is 30 m. therefore find the Meridional Parts for 45 d. 30 m. which are 3101, and right against

The Use of the foregoing Tables.

45 d. the difference in the last Column is 14. 56 m. is 6 m. above 50, therefore in the Table of Proportional Parts right against 14 and under 6, you will find the Proportional Part to be 8, which added to 3101, makes 3109, the *Meridional Parts* required.

To know the Hour when any Star cometh upon the Meridian any day of the Month.

The Rule. **F**irst seek the Right Ascension of that Star required in the foregoing Tables (of the Right Ascension of the Stars) and also the Right Ascension of the Sun for the day of the month, from the right Ascension of the Star subtract the Right Ascension of the Sun; but when the Right Ascension of the Star is less than the Right Ascension of the Sun then add 24 hours thereto, and the Remainder will shew you the hour after Noon when the Star comes upon the Meridian, and if it do exceed 12 hours, then subtract 12 hours therefrom, and the Remainder shall shew the hour and minute of the Stars coming upon the Meridian after midnight.

Example. 1. Upon the tenth of *April* I would know when the Lyons Heart cometh upon the Meridian. Therefore if you look in the Tables of Right Ascension for that Star, you will find it to be 9h. 51m. Then look in the Tables of Right Ascension of the Sun, and right against the tenth of *April* you will find the right Ascension of the Sun to be 1h. 54m. which subtracted from the Right Ascension of the Star, there remaineth 7h. 57m. which is the true time that the Star cometh to the Meridian afternoon.

Example. 2. Upon the fifth of *November*, I desire to know when the Bulls Eye cometh upon the Meridian: The Right Ascension thereof by the Tables you will find to be 4h. 17m. the right Ascension of the Sun that day is 15h. 23m. Therefore because the Right Ascension of the Star is less than the right Ascension of the Sun, I add 24 hours to the right Ascension of the Star, which maketh 28h. 17m. From which subtract the Right Ascension of the Sun, and the Remainder is 12h. 54m. from which I subtract the 12 hours, and the Remainder is 54 minutes after *Midnight*, then the said Star cometh upon the *Meridian*.

And here note, That the Table of Right Ascension of the Sun, is calculated for noon every day, and that it doth increase

The Use of the foregoing Table.

crease by about 4 minutes each day, so that it may be proportioned for every six hours to allow one minute for the time after noon.

The Use of the Table of Latitude and Longitude of Places.

In this Table there are two Columns, the first shewing the Latitude, the second the Longitude of Places. The Uses are,

I. To find the Latitude and Longitude of any Place.

Example. Of the *Start* on the Coast of England against the *Start*, in the first Column, the Latitude is 50d. 27m. which is North, and in the second Column the Longitude is 13d. 9m.

Of Cape Bona Esperanza.

The Latitude 34d. 24m. South.

The Longitude 38 10

II. To find the Diff. of Longitude between any two Places.

Take the Longitude of the two Places out of the Tables and subtract the lesser Longitude out of the greater, and if the Remainder be less than 180 deg. that is the Difference of Longitude; but if the Remainder be more than 180 deg. subtract it from 360, the last Remainder is the Difference of Longitude,

Example. 1. To find the Difference of Longitude between the *Lizard* and Cape Bona Esperanza.

The Longitude of the *Lizard* is

12d 37m.

The Longitude of Cape Bona Esperanza

38 10

The Difference of Longitude

25 33

Example. 2. To find the Difference of Longitude between the *Lizard* and the *Barbadoes*

The Longitude of *Barbadoes*

319d. 40m.

The Longitude of the *Lizard*

12 37

The first Remainder

307 03

Subtracted from

360 00

The last Remainder being the Diff. of Long.

52 57

III. To know when the Difference of Longitude between any two places is Easterly or Westerly

If the Remainder first found be less than 180d. and you

The Use of the foregoing Tables.

are to sail to that place which hath the greater Longitude of the two, your Difference of Longitude is easterly; but if you are to sail to that which hath the less, your difference of Longitude is Westerly.

2. If the Remainder first found be greater than 180 deg. then if you are bound to that place which hath the greater Longitude of the two, your Difference of Longitude is Westerly; if to that which hath the less, your difference of Longitude is Easterly.

The Use of the Table of the Sun's Declination.

THese Tables shew the Sun's Declination at Noon, for the years distinguish'd in the Title of the Table, in to the first, the second, third, and the Leap-year. In every Page of this Table there are seven Columns, in the first are the days of the Month, and in the other six the months of the Year. The Declination is distinguished by the Title of North and South at the head of the Table, and likewise against the 10th of March is (*Nor.*) for North, and against the 12th, or 13th of September is (*Sen.*) for south Declination, because about the 10th of March the Declination is changed from south to north, and about the 12th or 13th of September from north to south.

Example. To find the Sun's Declinat. May 10, at Noon, 1701.

Turn over the Table till you find the Year 1701, which you will find to be the first after Leap-year, and against the 10th day and under the month of May, you will find the Declination to be 20d. 13m. North. *Nota*, that in the Leap-year February hath 29 Days.

The Use of the Table of the Difference of Latitude and Departure.

THIS Table on each Page contains ten Columns, in the two outermost Columns of each Page stands the word *Dist.* it begins on the left hand Page at 1, and is continued to 30, and on the right hand page it begins at 31, and is continued to 60; in these Columns you must find your distance sailed: the other Columns of each page are distinguished by the Points and quarter Points of the Compasses, beginning

The Use of the foregoing Tables.

beginning at $\frac{1}{2}$ Point, and so $\frac{1}{2}$ Point, $\frac{3}{4}$ Point, 1 Point, and so increasing to 4 Points at the head of the Table, and beginning at 4 Points and increasing backward to $\frac{1}{2}$ Point at the foot of the Table; every quarter Point containing two Columns, distinguished by the words *Lat.* and *Dep.* signifying the Difference of Latitude and Departure, at the head and foot of the Table.

The chief Use of this Table is this, the Course and Distance being given, to find the Diff. Lat. and Departure.

Example 1. A Ship sails S. E. by S. $\frac{1}{2}$ E. 57 m. or miles, I demand the Difference of Latitude and Departure.

Note, your Course must always be accounted from the North or South Point of the Compass, according as your Course is Northerly or Southerly.

So your Course being S. E. by S. $\frac{1}{2}$ E. it is 3 Points $\frac{1}{2}$ from the South towards the East, and therefore your Difference of Latitude is Southerly and your Departure Easterly. Turn to the Table of Difference of Latitude and Departure, and look for 3 Points $\frac{1}{2}$ which you will find at the head of the Table, then look for your Distance 57 in the Column of Distance, which you will find upon the right hand page, then right against 57 miles in the Distance, and under 3 Points $\frac{1}{2}$ the Course under *Lat.* your Diff. Lat. is 44.2 and under *Dep.* your Departure 36.2, that is, your Diff. Lat. is 44 miles and 2 tenths of a mile, and your Departure 36 miles and 2 tenths.

Example 2. A Ship sails N. by W. $\frac{1}{4}$ W. 46 Leagues, I demand the Difference of Latitude and Departure.

The Course is 5 Points $\frac{1}{4}$ from the North towards the West, therefore your Diff. Lat. is northerly, and your Departure Westerly: look for 5 Points $\frac{1}{4}$ which you will find at the foot of the Table, and 46 your distance on the right hand page, then right against 46 and over 5 Points $\frac{1}{4}$ you will find your diff. Lat. over the Word *Lat.* at the foot of the Table, to be 23 leagues and 6 tenths, and your Departure over the word *Dep.* to be 39 leagues and 4 tenths of a league.

II. *How to make a Traverse by the Tables of the Difference of Latitude and Departure.*

Example. Suppose a Ship sail upon her direct Course N. W. $\frac{1}{2}$

The Use of the foregoing Tables.

W. 30 miles or min. but then by reason of contrary winds (allowing Let way) sails N. N. E. $\frac{1}{2}$ E. 20 miles, and S. W. $\frac{1}{2}$ W. 27 miles, and then N. N. W. $\frac{1}{4}$ W. 22 m. and W. N. W. $\frac{3}{4}$ W. 25 miles, to find Diff. Lat. and Dep. Make a Table of six Columns as here underneath, in the two first Columns insert your Course and Distance.

The Traverse-Table.

<i>Courses Sailed.</i>	<i>Distan. miles.</i>	<i>N. Diff.</i>	<i>S. Lat.</i>	<i>E. W. Departure.</i>
N. W. $\frac{1}{2}$ W.	30	31 7		38 7
N. N. E. $\frac{1}{2}$ E.	20	17 6		09 4
S. W. $\frac{1}{2}$ W.	27		17 2	21 0
N. N. W. $\frac{1}{4}$ W.	22	19 9		09 4
W. N. W. $\frac{3}{4}$ W.	25	06 0		24 2
		75 2	17 2	09 4
		17 2		09 4
	<i>Diff. Lat.</i>	58 0	<i>Departure.</i>	83 9

Then by the Table of Difference of Latitude and Departure find your difference of Latitude and Departure for your several Courses and Distances by the former directions, and Place it in their proper Columns, that is, if your Course is between the North and the East, place your difference of Latitude in the North Column and your departure in the East. If your Course is between the North and the West, Put your difference of Latitude in the North Column, and Your departure in the West. If it is between the South and the East, your difference of Latitude in the South Column and your departure in the East. If it is between the South and the West, your difference of Latitude in the South Column and your departure in the West.

If the Ship sails directly North, or directly South, she only makes difference of Latitude, which is Northerly or Southerly according to the Course; and if she sail directly East or West, she only makes departure, which is Easterly or Westerly according to the Course. Having thus placed your

The Use of the foregoing Table.

your difference of Latitude and Departure in their proper Columns of North, South, East and West, as you see in the foregoing Table; the Sum of the North Column is 75.2 of the South 17.2, of the East 9.4, and of the West 93.3, then consider the Sum of the North and South Columns, which is greatest, and subtract the least therefrom, and so likewise of the East and West Columns. So in the foresaid Table the South Column subtracted from the North, the Remainder is 58.0, which is the difference of Latitude Northerly, and the East Column subtracted from the West, the Remainder is 83.9, which is the departure westerly, which was required to be found.

The Use of the Almanack.

BY the former Table you may see what day of the Week the first of *March* falls on in any of those years, which being known you may readily find any day of the Week or Month throughout the year.

Example If you would know what day of the week the 7th of *June* is 1702. Having seen by the Table that the first of *March* is *Sunday* look in the Column of the Almanack fielow against *June*, and you will find that the 7, 14, 21, 28 days of that Month are *Sundays*. Again, if you would know what day of the Month the third *Sunday* in *May* 1702 is; that year the first of *March* falling on *Monday*, looking in the Column of the Almanack even with *May*, I find the second *Monday* of that Month to be the 10th day, and the third *Sunday* to be the 16th.

Note, In this Computation the year begins the first of *March*, and ends the last of *February*.

The brief Use of the Table of Logarithms, and of the Logarithmecal Sines and Tangents.

1. The Use of Logarithms for Numbers.

THIS Table contains the Logarithms of Numbers, increasing in their natural Order, from 1 to 10000; every Page containing 100 Logarithms, marked at the top with 100, 200, 300, &c. and their Use is,

1. A Number being given to find the Logarithm thereto.

Suppose the given Number were 229, to find the Logarithm thereto.

The Use of the foregoing Tables.

Upon the Page marked with 200, under (*Num.*) at the top of the Page, look for the Number 229, and in the next adjoining Column under (*Logarithm*) is 2.3598355, which is the Logarithm sought.

Suppose you were to find the Logarithm of 1497.

In the Page marked with 1400, under (*Num.*) you will find the Number 1497, and in the adjoining Column under (*Logarithm*) 3.1752218, the Logarithm sought.

2. A Logarithm being given, to find the Numbers corresponding.

Suppose the given Logarithm were 2.9813655, to find the Number answering thereto.

Run down the Columns under (*Logarithm*) and in the Page marked with 900, you will find this Logarithm, and the Number answering thereto is 958, which was required.

Suppose the Logarithm given were 3.101852, to find the Number answering thereto.

Look down those Columns of Logarithms that begin with 3, and in the Page marked with 1200, you will find the nearest Logarithm thereto to be 3.1017471, and the Number answering thereto to be 1264, which was required.

II. Use of the Tables of Sines and Tangents.

This Table contains the Logarithmical Sines and Tangents of every degree and minute of the Quadrant, and their use is,

1. To find the Sine or Tangent of any degree and minute.

If the degree be less than 45 your Sine or Tang. is found in those Columns, which are distinguished by the Words (*Sine*) (*Tangent*) at the head of the Table; but if the degrees exceed 45, then your Sine or Tangent is found in those Columns which are distinguished with the word (*Sine*) (*Tang.*) at the foot of the Table.

Suppose you were to find the Log. Sine or Tangent of 32 d. 12 min. Look for 32 d. at the head of the Table, and upon the left hand page in the Column of Minutes under the word (*Min.*) you shall find 12 m. and against 12 m. and under (*Sine*) at the head of the Table, you shall find 9.7266264, which is the Log. Sine of 32 d. 12 m. and under (*Tang.*) you have 9.7991569, the Log. Tangent of 32 d. 12 m.

Suppose you were to find the Log. Sine or Tang. of 37 d. 47 m. Turn to 37 d. at the head of the Table, and upon the

The Use of the foregoing Tables.

the right hand page (because the Minutes exceed 30) in the Column of Minutes under (*Min.*) you must look for 47 m. and against 47 m. and under (*Sine*) at the head of the Table you will find 9.7872317, the Sine of 37 d. 47 m. and against 47, and under (*Tang.*) you will find 9.8894214, the Tangent of 37 d. 47 m.

Suppose you were to find the Log. Sine or Tangent of 64 d. 15 m. Turn to 64 d. at the foot of the Table and upon the right hand page in the Column of Minutes, over the word (*Min.*) look upwards for 15 m. against 15 m. and over (*Sine*) at the Foot of the Table you will find 9.9545793, the Sine 64 d. 15 m. and against 15 m. over (*Tang.*) you will find 10.3166443, the Tangent of 64 d. 15 m.

Suppose you were to find the Log. Sine or Tangent of 78 d. 45 m. Turn to 78 d. at the Foot of the Table. And upon the left hand (because the Minutes exceed 30) in the Column of Minutes over (*Min.*) look for 45 m. against 45, and over (*Sine*) you find the Sine of 78 d. 45 m. to be 9.9915739, and the Tangent in the same Line over (*Tang.*) to be 10.7013382.

3. A Logarithmical Sine or Tangent being given, to find the Degrees and Minutes answering thereto.

This is but the Converse of the former, but that you may the more readily turn to the Deg. and Min. take this brief direction.

If it be a Sine, and the five first Figures less then 98494, or a Tangent less than Radius, or 10.0000000, then it is a Sine or Tangent of less than 45 d. and is to be sought in those Columns distinguished with (*Sine*) (*Tang.*) at the Head of the Table; but if the Sine or Tangent exceed these respective Numbers, then the degrees answering thereto are more than 45, and they are to be found in those Columns distinguished by (*Sine*) (*Tang.*) at the Foot of the Table.

Suppose you were to find the degrees and minutes corresponding to this Sine 9.7035329, this being less than 45, I run over the Columns of Sines, distinguished by (*Sine*) at the Top, and under 30 d. and against 21 m. I find the given Sine.

Suppose I were to find the degree and minute corresponding to this Tangent 10.3851939, this being greater than 45 d. I run over the Columns of Tangents distinguished by (*Tang.*) at the Foot of the Table, and over 67 d. 39 m.

1. Note.

The Use of the foregoing Tables.

1. *Note*, If you are to find the Sine or Tangent of any Number of degrees or minutes exceeding 90. As suppose you were to find the Tangent of 127d. 39m. subtract 127d. 39m. from 180d. 0m. and find the Tangent of the Remainder, viz. the Tangent 52d. 21m. which is also the Tangent 127d. 39m. as was required.

2. *Note*, That if it be required to find the Sine Complement or Tangent Complement of any degree and minute less than 90d. you must look the degrees and minutes, as is before directed, and under (*Sine Complement*) or (*Tangent Complement*) at the Head of the Table; if your degree be less than 45d. or over (*Sine Complement*) or (*Tangent Complement*) at the Foot of the Table, if your degree exceeds 45, you will find against the respective *Minutes*, the Sine Complement or Tangent Complement required.

Suppose it were required to find the Sine Complement or Tangent Complement of 36d. 49m. Turn to 36d. at the Head of the Table, and under (*Sine Complement*) and right against 49m. you will find 9.9033923, and under *Tangent Complement* 10.1257796, which is the Sine Complement or Tangent Complement required.

To find readily the Complement Arithmetical of a Logarithm

The Complement Arithmetical of a Logarithm is the Residue of that Logarithm to 10 00000, or to 20.0000000, & the Complement Arithmetical of 9.9198464 is 00801536, for if you subtract 9.9198464 from 10.0000000, the Remainder is 00801536: but a readier way is this, take the Residue or Remainder of the first figure to 9, and so of the rest until you come to the last Figure, which take unto 16; thus to take the Complement Arithmetical of 9.9198464, for 9 put 0, for 9, 0, for 1, 8, for 9, 0, for 8, 1, for 4, 5, for 6, 3, for 4, (the last Figure) 6; and so I have 00801536, the Complement Arithmetical as before. If there be 2 Figures before the full point, as 10. 11. 12. or 13. you must then reject the First Figure, and take the Complement Arithmetical of the other as before; as suppose you were to find the Complement Arithmetical of 10.9652480, reject the first 1, then for 0 write 9, for 5, 0, for 6, 3, for 5, 4, for 2, 7, for 4, 5, for 8, 2, being the last Figure is 0, and then the 0 is the last place, so the Complement Arithmetical is 9.0347520.

A
TRIANGULAR
CANON
LOGARITHMICAL:
OR, A
TABLE
OF

Artificial Sines and Tangents,
To every Degree and Minute
of the QUADRANT.

The Common Radius being 10.0000000.

With a TABLE of
LOGARITHMS.
From an UNIT to 10000.

London, Printed for R. Mount on Tower-Hill, 1706.

0 Degrees.					
Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	
00	0.0000000	10.0000000	0.0000000	<i>Infinite.</i>	60
1	6.4637261	9.9999999	6.4637261	13.5362739	59
2	6.7647561	9.9999999	6.7647562	13.2352438	58
3	6.9408473	9.9999998	6.9408475	13.0591525	57
4	7.0657860	9.9999997	7.0657863	12.9342127	56
5	7.1626960	9.9999995	7.1626964	12.8373036	55
6	7.2418771	9.9999993	7.2418778	12.7581222	54
7	7.3088239	9.9999991	7.3088247	12.6911752	53
8	7.3668157	9.9999988	7.3668169	12.6331831	52
9	7.4179681	9.9999985	7.4179696	12.5820304	51
10	7.4637235	9.9999982	7.4637273	12.5362727	50
11	7.5051181	9.9999978	7.5051203	12.4948797	49
12	7.5429065	9.9999974	7.5429091	12.4570909	48
13	7.5776684	9.9999969	7.5776715	12.4223285	47
14	7.6098530	9.9999964	7.6098566	12.3901434	46
15	7.63998160	9.9999959	7.63998201	12.3601799	45
16	7.6678445	9.9999953	7.6678492	12.3321508	44
17	7.6941733	9.9999947	7.6941786	12.3058214	43
18	7.7189966	9.9999940	7.7190026	12.2809974	42
19	7.7424775	9.9999934	7.7424841	12.2575159	41
20	7.7647537	9.9999927	7.7647610	12.2352390	40
21	7.7859427	9.9999919	7.7859508	12.2140492	39
22	7.8061458	9.9999911	7.8061547	12.1938453	38
23	7.8254507	9.9999903	7.8254604	12.1745396	37
24	7.8439398	9.9999894	7.8439444	12.1560556	36
25	7.8616623	9.9999885	7.8616738	12.1383262	35
26	7.8786953	9.9999876	7.8787077	12.1212923	34
27	7.8950854	9.9999866	7.8950988	12.1049012	33
28	7.9108793	9.9999855	7.9108938	12.0891062	32
29	7.9261190	9.9999845	7.9261344	12.0738656	31
30	7.9408419	9.9999835	7.9408584	12.0591416	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.
89 Degrees.					

o Degree.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	7.9408419	9.9999835	7.9408584	12.0591416	30
31	7.9550819	9.9999823	7.9550996	12.0449004	39
32	7.9688698	9.9999812	7.9688886	12.0311114	28
33	7.9822334	9.9999800	7.9822534	12.0177466	27
34	7.9951980	9.9999788	7.9952192	12.0047808	26
35	8.0077867	9.9999775	8.0078092	11.9921908	25
36	8.0200207	9.9999762	8.0200445	11.9799555	24
37	8.0319195	9.9999748	8.0319446	11.9680554	23
38	8.0435009	9.9999735	8.0435274	11.9564726	22
39	8.0547814	9.9999721	8.0548094	11.9451906	21
40	8.0657763	9.9999706	8.0658037	11.9341943	20
41	8.0764997	9.9999691	8.0765306	11.9234694	19
42	8.0869646	9.9999676	8.0869970	11.9130030	18
43	8.0971832	9.9999660	8.0972172	11.9027828	17
44	8.1071669	9.9999644	8.1072025	11.8927975	16
45	8.1169262	9.9999628	8.1169634	11.8830366	15
46	8.1264710	9.9999611	8.1265099	11.8734901	14
47	8.1358104	9.9999594	8.1358510	11.8641490	13
48	8.1449532	9.9999577	8.1449956	11.8550044	12
49	8.1539075	9.9999559	8.1539516	11.8460484	11
50	8.1626808	9.9999541	8.1627267	11.8372733	10
51	8.1712804	9.9999522	8.1713282	11.8286718	9
52	8.1797129	9.9999503	8.1797626	11.8202374	8
53	8.1879848	9.9999484	8.1880364	11.8119636	7
54	8.1961020	9.9999464	8.1961536	11.8038444	6
55	8.2040703	9.9999444	8.2041259	11.7958741	5
56	8.2118949	9.9999424	8.2119526	11.7880474	4
57	8.2195811	9.9999403	8.2196408	11.7803592	3
58	8.2271335	9.9999382	8.2271953	11.7728047	2
59	8.2345568	9.9999360	8.2346208	11.7653792	1
60	8.2418553	9.9999338	8.2419215	11.7580785	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	

89 Degrees.

1 Degree.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	8.2418553	9.9999338	8.2419215	11.7580785	60
1	8.2490332	9.9999316	8.2491015	11.7508985	59
2	8.2560943	9.9999294	8.2561649	11.7438351	58
3	8.2630424	9.9999271	8.2631153	11.7368847	57
4	8.2698810	9.9999247	8.2699563	11.7300437	56
5	8.2766136	9.9999224	8.2766912	11.7233088	55
6	8.2832434	9.9999200	8.2833234	11.7166766	54
7	8.2897734	9.9999175	8.2898559	11.7101441	53
8	8.2962067	9.9999150	8.2962917	11.7037083	52
9	8.3025460	9.9999125	8.3026335	11.6973665	51
10	8.3087941	9.9999100	8.3088842	11.6911158	50
11	8.3149536	9.9999074	8.3150462	11.6849538	49
12	8.3210269	9.9999047	8.3211221	11.6788779	48
13	8.3270163	9.9999021	8.3271143	11.6728857	47
14	8.3329243	9.9998994	8.3330249	11.6669751	46
15	8.3387529	9.9998966	8.3388563	11.6611437	45
16	8.3445043	9.9998939	8.3446105	11.6553895	44
17	8.3501805	9.9998911	8.3502895	11.6497105	43
18	8.3557835	9.9998882	8.3558953	11.6441047	42
19	8.3613150	9.9998853	8.3614297	11.6385703	41
20	8.3667769	9.9998824	8.3668945	11.6331055	40
21	8.3721710	9.9998794	8.3722915	11.6277085	39
22	8.3774988	9.9998764	8.3776223	11.6223777	38
23	8.3827620	9.9998734	8.3828886	11.6171114	37
24	8.3879622	9.9998703	8.3880918	11.6119082	36
25	8.3931008	9.9998672	8.3932236	11.6067664	35
26	8.3981793	9.9998641	8.3983152	11.6016848	34
27	8.4031990	9.9998609	8.4033381	11.5966619	33
28	8.4081614	9.9998577	8.4083037	11.5916963	32
29	8.4130676	9.9998544	8.4132132	11.5867868	31
30	8.4179190	9.9998512	8.4180679	11.5819321	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

1 Degree.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	8.4179190	9.9998312	8.4180679	11.5819321	30
31	8.4227168	9.9998478	8.4228690	11.5771310	29
32	8.4274621	9.9998445	8.4276176	11.5723824	28
33	8.4321561	9.9998411	8.4323150	11.5676850	27
34	8.4367999	9.9998376	8.4369622	11.5630378	26
35	8.4413944	9.9998342	8.4415603	11.5584397	25
36	8.4459409	9.9998306	8.4461103	11.5538897	24
37	8.4504402	9.9998271	8.4506131	11.5493869	23
38	8.4548934	9.9998233	8.4550699	11.5449301	22
39	8.4593013	9.9998199	8.4594814	11.5405186	21
40	8.4636649	9.9998162	8.4638486	11.5361514	20
41	8.4679850	9.9998125	8.4681725	11.5318275	19
42	8.4722626	9.9998088	8.4724538	11.5275452	18
43	8.4764984	9.9998050	8.4766933	11.5233067	17
44	8.4806932	9.9998012	8.4808920	11.5191080	16
45	8.4848479	9.9997974	8.4850505	11.5149495	15
46	8.4889632	9.9997935	8.4891696	11.5108304	14
47	8.4930398	9.9997896	8.4932502	11.5067498	13
48	8.4970784	9.9997856	8.4972928	11.5027072	12
49	8.5010798	9.9997817	8.5012982	11.4987018	11
50	8.5050447	9.9997776	8.5052671	11.4947329	10
51	8.5089736	9.9997736	8.5092001	11.4907999	9
52	8.5128673	9.9997695	8.5130978	11.4869022	8
53	8.5167264	9.9997653	8.5169610	11.4830387	7
54	8.5205514	9.9997612	8.5207902	11.4792093	6
55	8.5243430	9.9997570	8.5245860	11.4754140	5
56	8.5281017	9.9997527	8.5283490	11.4716510	4
57	8.5318281	9.9997484	8.5320797	11.4679203	3
58	8.5355228	9.9997441	8.5357787	11.4642213	2
59	8.5391863	9.9997398	8.5394466	11.4605534	1
60	8.5428192	9.9997354	8.5430838	11.4569162	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	

88, Degrees.

2 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	8.5428192	9.9997354	8.5430838	11.4569162	60
1	8.5464218	9.9997309	8.5466909	11.4533091	59
2	8.5499948	9.9997265	8.5502683	11.4497317	58
3	8.5535386	9.9997220	8.5538166	11.4461834	57
4	8.5570536	9.9997174	8.5573362	11.4426638	56
5	8.5605404	9.9997128	8.5608276	11.4391724	55
6	8.5639994	9.9997082	8.5642912	11.4357088	54
7	8.5674310	9.9997036	8.5677275	11.4322725	53
8	8.5708357	9.9996989	8.5711368	11.4288632	52
9	8.5742139	9.9996942	8.5745197	11.4254803	51
10	8.5775660	9.9996894	8.5778766	11.4221234	50
11	8.5808923	9.9996846	8.5812077	11.4187923	49
12	8.5841933	9.9996798	8.5845136	11.4154864	48
13	8.5874694	9.9996749	8.5877945	11.4122055	47
14	8.5907205	9.9996700	8.5910509	11.4089491	46
15	8.5939485	9.9996650	8.5942832	11.4057168	45
16	8.5971517	9.9996601	8.5974917	11.4025083	44
17	8.6003317	9.9996550	8.6006767	11.3993233	43
18	8.6034886	9.9996500	8.6038386	11.3961614	42
19	8.6066226	9.9996449	8.6069777	11.3930223	41
20	8.6097341	9.9996398	8.6100943	11.3899057	40
21	8.6128235	9.9996346	8.6131889	11.3868111	39
22	8.6158910	9.9996294	8.6162616	11.3837384	38
23	8.6189369	9.9996242	8.6193127	11.3806873	37
24	8.6219616	9.9996189	8.6223427	11.3776573	36
25	8.6249653	9.9996136	8.6253518	11.3746482	35
26	8.6279484	9.9996082	8.6283402	11.3716598	34
27	8.6309111	9.9996028	8.6313083	11.3686917	33
28	8.6338537	9.9995974	8.6342563	11.3657437	32
29	8.6367764	9.9995919	8.6371845	11.3628155	31
30	8.6396796	9.9995865	8.6400931	11.3599059	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

87 Degrees.

2 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	8.6396796	9.9995865	8.6410093	11.3599069	30
31	8.6425634	9.9995809	8.6429825	11.3570175	29
32	8.6454282	9.9995753	8.6458528	11.3541472	28
33	8.6482742	9.9995697	8.6487044	11.3512956	27
34	8.6511016	9.9995641	8.6515375	11.3484625	26
35	8.6539107	9.9995584	8.6543522	11.3456478	25
36	8.6567017	9.9995527	8.6571490	11.3428510	24
37	8.6594748	9.9995469	8.6599279	11.3400721	23
38	8.6622303	9.9995413	8.6626891	11.3373109	22
39	8.6649684	9.9995353	8.6654331	11.3345669	21
40	8.6676893	9.9995297	8.6681598	11.3318402	20
41	8.6703932	9.9995236	8.6708697	11.3291303	19
42	8.6730804	9.9995176	8.6735628	11.3264372	18
43	8.6757516	9.9995116	8.6762393	11.3237607	17
44	8.6784052	9.9995056	8.6788996	11.3211004	16
45	8.6810433	9.9994996	8.6815437	11.3184563	15
46	8.6836654	9.9994935	8.6841719	11.3158281	14
47	8.6862718	9.9994874	8.6867844	11.3132156	13
48	8.6888625	9.9994812	8.6893813	11.3106187	12
49	8.6914379	9.9994750	8.6919929	11.3080371	11
50	8.6939980	9.9994688	8.6945292	11.3054708	10
51	8.6965431	9.9994625	8.6970806	11.3029194	9
52	8.6990734	9.9994562	8.6996173	11.3003828	8
53	8.7015889	9.9994498	8.7021390	11.2978610	7
54	8.7040899	9.9994435	8.7046465	11.2953535	6
55	8.7065766	9.9994370	8.7071395	11.2928603	5
56	8.7090490	9.9994306	8.7096185	11.2903813	4
57	8.7115075	9.9994241	8.7120834	11.2879156	3
58	8.7139520	9.9994176	8.7145345	11.2854653	2
59	8.7163829	9.9994110	8.7169719	11.2830281	1
60	8.7188002	9.9994044	8.7193958	11.2806042	0
Sine Complem.	Sine.	Tangent Complem.	Tang.		Minutes.

87 Degrees.

3 Degrees.

Minutes,	Sine.	Sine Complem.	Tang.	Tangent Complem.	
0	8.7188002	9.9994044	8.7193958	11.2806042	60
1	8.7212040	9.9993978	8.7218063	11.2781937	59
2	8.7235946	9.9993911	8.7242035	11.2757965	58
3	8.7259721	9.9993844	8.7265877	11.2734123	57
4	8.7283366	9.9993776	8.7289589	11.2710411	56
5	8.7306882	9.9993708	8.7313174	11.2686826	55
6	8.7330272	9.9993640	8.7336631	11.2663369	54
7	8.7353535	9.9993572	8.7359964	11.2640036	53
8	8.7376675	9.9993503	8.7383172	11.2616828	52
9	8.7399691	9.9993433	8.7406258	11.2593742	51
10	8.7422586	9.9993364	8.7429222	11.2570778	50
11	8.7445360	9.9993293	8.7452067	11.2547933	49
12	8.7468051	9.9993223	8.7474792	11.2525208	48
13	8.7490553	9.9993152	8.7497400	11.2502600	47
14	8.7512973	9.9993081	8.7519892	11.2480108	46
15	8.7535278	9.9993009	8.7542269	11.2457731	45
16	8.7557469	9.9992938	8.7564531	11.2435469	44
17	8.7579546	9.9992865	8.7586681	11.2413319	43
18	8.7601512	9.9992793	8.7608719	11.2391281	42
19	8.7623366	9.9992720	8.7630647	11.2369353	41
20	8.7645111	9.9992646	8.7652465	11.2347535	40
21	8.7666747	9.9992572	8.7674175	11.2325825	39
22	8.7688275	9.9992498	8.7695777	11.2304223	38
23	8.7709697	9.9992424	8.7717274	11.2282726	37
24	8.7731014	9.9992349	8.7738665	11.2261335	36
25	8.7752226	9.9992274	8.7759952	11.2240048	35
26	8.7773334	9.9992198	8.7781136	11.2218864	34
27	8.7794340	9.9992122	8.7802218	11.2197782	33
28	8.7815244	9.9992046	8.7823199	11.2176801	32
29	8.7836048	9.9991969	8.7844079	11.2155921	31
30	8.7856753	9.9991892	8.7864861	11.2135139	30
	Sine Complem.	Sine.	Tang. Complem.	Tang.	Minutes.

3 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complement	Minutes.
30	8.7856753	9.9991892	8.7864861	11.2135139	30
31	8.7877359	9.9991815	8.7885544	11.2114456	29
32	8.7897867	9.9991737	8.7906130	11.2093870	28
33	8.7918278	9.9991659	8.7926620	11.2073380	27
34	8.7938594	9.9991580	8.7947014	11.2052988	26
35	8.7958814	9.9991501	8.7967313	11.2032687	25
36	8.7978941	9.9991422	8.7987519	11.2012481	24
37	8.7998974	9.9991342	8.8007632	11.1992368	23
38	8.8018915	9.9991262	8.8027653	11.1972247	22
39	8.8038764	9.9991182	8.8047583	11.1952117	21
40	8.8058523	9.9991101	8.8067422	11.1932578	20
41	8.8078192	9.9991020	8.8087172	11.1912828	19
42	8.8097772	9.9990938	8.8106834	11.1893166	18
43	8.8117264	9.9990856	8.8126407	11.1873593	17
44	8.8136668	9.9990774	8.8145894	11.1854106	16
45	8.8155985	9.9990691	8.8165394	11.1834706	15
46	8.8175217	9.9990608	8.8184608	11.1815392	14
47	8.8194363	9.9990525	8.8203838	11.1796162	13
48	8.8213425	9.9990441	8.8222984	11.1777016	12
49	8.8232404	9.9990357	8.8242046	11.1757954	11
50	8.8251299	9.9990273	8.8261026	11.1738974	10
51	8.8270112	9.9990188	8.8279924	11.1720076	9
52	8.8288844	9.9990103	8.8298741	11.1701259	8
53	8.8307495	9.9990017	8.8317478	11.1682522	7
54	8.8326065	9.9989931	8.8336134	11.1663866	6
55	8.8344557	9.9989845	8.8354712	11.1645288	5
56	8.8362969	9.9989758	8.8373211	11.1626789	4
57	8.8381304	9.9989671	8.8391633	11.1608367	3
58	8.8399561	9.9989584	8.8409977	11.1590023	2
59	8.8417741	9.9989496	8.8428245	11.1571755	1
60	8.8435845	9.9989408	8.8446437	11.1553563	0
Sine Complem.	Sine.	Tangent Complem.	Tang.		

3 Degrees.

4. Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complement	Minutes.
0	8.8435845	9.9989408	8.844643	11.1553563	60
1	8.8455874	9.9989319	8.8464554	11.1535446	59
2	8.8471827	9.9989230	8.8482597	11.1517403	58
3	8.8489707	9.9989141	8.8500366	11.1499434	57
4	8.8507512	9.9989052	8.8518461	11.1481539	56
5	8.8525245	9.9988962	8.8536283	11.1463717	55
6	8.8542905	9.9988871	8.8554034	11.1445966	54
7	8.8560493	9.9988780	8.8571713	11.1428287	53
8	8.8578010	9.9988689	8.8589321	11.1410679	52
9	8.8595457	9.9988598	8.8606859	11.1393141	51
10	8.8612833	9.9988506	8.8624327	11.1375673	50
11	8.8630139	9.9988414	8.8641725	11.1358275	49
12	8.8647376	9.9988321	8.8659055	11.1340945	48
13	8.8664545	9.9988228	8.8676317	11.1323683	47
14	8.8681646	9.9988135	8.8693511	11.1306489	46
15	8.8698680	9.9988041	8.8710638	11.1289362	45
16	8.8715646	9.9987947	8.8727699	11.1272301	44
17	8.8732546	9.9987853	8.8744694	11.1255306	43
18	8.8749381	9.9987758	8.8761623	11.1238377	42
19	8.8766150	9.9987663	8.8778487	11.1221513	41
20	8.8782854	9.9987567	8.8795286	11.1204714	40
21	8.8799493	9.9987471	8.8812022	11.1187978	39
22	8.8816069	9.9987375	8.8828694	11.1171306	38
23	8.8832581	9.9987278	8.8845303	11.1154697	37
24	8.8849031	9.9987181	8.8861850	11.1138150	36
25	8.8865418	9.9987084	8.8878334	11.1121666	35
26	8.8881743	9.9986986	8.8894757	11.1105243	34
27	8.8898007	9.9986888	8.8911119	11.1088881	33
28	8.8914209	9.9986790	8.8927420	11.1072580	32
29	8.8930351	9.9986691	8.8943660	11.1056340	31
30	8.8946433	9.9986591	8.8959842	11.1040158	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

85 Degrees.

4 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	8.8946433	9.9986591	8.8959842	11.1040158	30
31	8.8962455	9.9986492	8.8975963	11.1024037	29
32	8.8978488	9.9986392	8.8992026	11.1007974	28
33	8.8994520	9.9986292	8.9008030	11.0991970	27
34	8.9010168	9.9986191	8.9023977	11.0976023	26
35	8.9025655	9.9986090	8.9039866	11.0960134	25
36	8.9041689	9.9985988	8.9055897	11.0944303	24
37	8.9057338	9.9985886	8.9071472	11.0928528	23
38	8.9072975	9.9985784	8.9087190	11.0912816	22
39	8.9088535	9.9985682	8.9102833	11.0897147	21
40	8.9104039	9.9985579	8.9118460	11.0881540	20
41	8.9119487	9.9985475	8.9134012	11.0865988	19
42	8.9134888	9.9985372	8.9149509	11.0850491	18
43	8.9150219	9.9985268	8.9164952	11.0835048	17
44	8.9165504	9.9985163	8.9180340	11.0819560	16
45	8.9180734	9.9985058	8.9195675	11.0804125	15
46	8.9195911	9.9984953	8.9210957	11.0788643	14
47	8.9211034	9.9984848	8.9226186	11.0773114	13
48	8.9226105	9.9984742	8.9241363	11.0757637	12
49	8.9241123	9.9984636	8.9256487	11.0742113	11
50	8.9256089	9.9984529	8.9271560	11.0726440	10
51	8.9271003	9.9984422	8.9286581	11.0710719	9
52	8.9285866	9.9984315	8.9301552	11.0694948	8
53	8.9300678	9.9984207	8.9316471	11.0679129	7
54	8.9315439	9.9984099	8.9331340	11.0663260	6
55	8.9330150	9.9983990	8.9346160	11.0647340	5
56	8.9344811	9.9983881	8.9360929	11.0631397	4
57	8.9359422	9.9983772	8.9375650	11.0615435	3
58	8.9373983	9.9983663	8.9390321	11.0599467	2
59	8.9388496	9.9983553	8.9404944	11.0583483	1
60	8.9402960	9.9983442	8.9419518	11.0567482	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	

85 Degrees.

5 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	8.9402960	9.9983442	8.9419516	11.0580482	60
1	8.9417376	9.9983332	8.9434044	11.0565956	59
2	8.9431743	9.9983220	8.9448523	11.0551477	58
3	8.9446063	9.9983109	8.9462954	11.0537046	57
4	8.9460335	9.9982997	8.9477338	11.0522662	56
5	8.9474561	9.9982885	8.9491676	11.0508324	55
6	8.9488739	9.9982772	8.9505967	11.0494033	54
7	8.9502871	9.9982660	8.9520211	11.0479789	53
8	8.9516957	9.9982546	8.9534410	11.0465590	52
9	8.9530996	9.9982433	8.9548564	11.0451436	51
10	8.9544991	9.9982318	8.9562672	11.0437328	50
11	8.9558940	9.9982204	8.9576735	11.0423265	49
12	8.9572843	9.9982089	8.9590754	11.0409246	48
13	8.9586703	9.9981974	8.9604728	11.0395272	47
14	8.9600517	9.9981859	8.9618659	11.0381341	46
15	8.9614288	9.9981743	8.9632545	11.0367455	45
16	8.9628014	9.9981629	8.9646386	11.0353612	44
17	8.9641697	9.9981510	8.9660188	11.0339812	43
18	8.9655337	9.9981393	8.9673944	11.0326056	42
19	8.9668934	9.9981275	8.9687658	11.0312342	41
20	8.9682487	9.9981158	8.9701330	11.0298670	40
21	8.9695999	9.9981040	8.9714959	11.0285041	39
22	8.9709468	9.9980921	8.9728547	11.0271453	38
23	8.9722895	9.9980802	8.9742092	11.0257908	37
24	8.9736280	9.9980683	8.9755559	11.0244403	36
25	8.9749624	9.9980563	8.9769050	11.0230940	35
26	8.9762926	9.9980443	8.9782483	11.0217517	34
27	8.9776188	9.9980323	8.9795865	11.0204135	33
28	8.9789408	9.9980202	8.9809206	11.0190794	32
29	8.9802589	9.9980081	8.9822507	11.0177493	31
30	8.9815729	9.9979960	8.9835769	11.0164231	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

81 Degrees.

5 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
50	8.9815729	9.9979960	8.9835769	11.0164231	30
51	8.9828829	9.9979838	8.9848991	11.0151009	29
52	8.9841889	9.9979716	8.9862173	11.0137827	28
53	8.9854910	9.9979593	8.9875317	11.0124683	27
54	8.9867891	9.9979470	8.9888421	11.0111579	26
55	8.9880834	9.9979347	8.9901487	11.0098513	25
56	8.9893737	9.9979223	8.9914514	11.0085486	24
57	8.9906602	9.9979099	8.9927503	11.0072497	23
58	8.9919429	9.9978975	8.9940454	11.0059546	22
59	8.9932217	9.9978850	8.9953367	11.0046633	21
60	8.9944968	9.9978725	8.9966243	11.0033757	20
41	8.9957681	9.9978599	8.9979081	11.0020916	19
42	8.9970356	9.9978473	8.9991883	11.0008117	18
43	8.9982994	9.9978347	9.0004647	10.9995353	17
44	8.9995595	9.9978220	9.0017375	10.9982625	16
45	9.0008160	9.9978093	9.0030066	10.9969934	15
46	9.0020687	9.9977966	9.0042721	10.9957279	14
47	9.0033179	9.9977838	9.0055340	10.9944660	13
48	9.0045634	9.9977710	9.0067924	10.9932076	12
49	9.0058053	9.9977582	9.0080471	10.9919529	11
50	9.0070436	9.9977453	9.0092984	10.9907016	10
51	9.0082784	9.9977323	9.0105461	10.9894535	9
52	9.0095096	9.9977194	9.0117903	10.9882097	8
53	9.0107374	9.9977064	9.0130310	10.9869690	7
54	9.0119616	9.9976933	9.0142682	10.9857318	6
55	9.0131823	9.9976803	9.0155021	10.9844979	5
56	9.0143996	9.9976672	9.0167325	10.9832675	4
57	9.0156135	9.9976540	9.0179594	10.9820406	3
58	9.0168239	9.9976408	9.0191831	10.9808169	2
59	9.0180309	9.9976276	9.0204033	10.9795967	1
60	9.0192346	9.9976143	9.0216202	10.9783798	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

84 Degrees.

6 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.0192345	9.9976143	9.0216202	10.9783798	60
1	9.0204348	9.9976011	9.0228338	10.9771662	59
2	9.0216318	9.9975877	9.0240441	10.9759559	58
3	9.0228254	9.9975743	9.0252510	10.9747490	57
4	9.0240157	9.9975609	9.0264548	10.9735452	56
5	9.0252027	9.9975475	9.0276552	10.9723448	55
6	9.0263865	9.9975340	9.0288524	10.9711476	54
7	9.0275669	9.9975205	9.0300464	10.9699536	53
8	9.0287442	9.9975069	9.0312373	10.9687627	52
9	9.0299182	9.9974933	9.0324249	10.9675751	51
10	9.0310890	9.9974797	9.0336093	10.9663907	50
11	9.0322567	9.9974660	9.0347906	10.9652094	49
12	9.0334212	9.9974523	9.0359688	10.9640312	48
13	9.0345825	9.9974386	9.0371439	10.9628561	47
14	9.0357407	9.9974248	9.0383150	10.9616841	46
15	9.0368958	9.9974110	9.0394848	10.9605152	45
16	9.0380477	9.9973971	9.0406506	10.9593494	44
17	9.0391966	9.9973833	9.0418134	10.9581866	43
18	9.0403424	9.9973693	9.0429731	10.9570269	42
19	9.0414852	9.9973554	9.0441299	10.9558701	41
20	9.0426249	9.9973414	9.0452836	10.9547164	40
21	9.0437617	9.9973273	9.0464343	10.9535657	39
22	9.0448954	9.9973132	9.0475821	10.9524179	38
23	9.0460261	9.9972991	9.0487270	10.9512730	37
24	9.0471536	9.9972850	9.0498689	10.9501311	36
25	9.0482786	9.9972708	9.0510078	10.9489920	35
26	9.0494005	9.9972566	9.0521439	10.9478561	34
27	9.0505194	9.9972423	9.0532771	10.9467229	33
28	9.0516354	9.9972280	9.0544074	10.9455926	32
29	9.0527485	9.9972137	9.0555346	10.9444651	31
30	9.0538588	9.9971993	9.0566595	10.9433405	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

6 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	
30	9.9538588	9.9971993	9.0566595	10.9433405	30
31	9.9549561	9.9971849	9.0577813	10.9422187	29
32	9.9560706	9.9971704	9.0589002	10.9410998	28
33	9.9571723	9.9971559	9.0600164	10.9399836	27
34	9.9582711	9.9971414	9.0611297	10.9388703	26
35	9.9593671	9.9971268	9.0622403	10.9377597	25
36	9.9604604	9.9971122	9.0633482	10.9366518	24
37	9.9615509	9.9970976	9.0644533	10.9355467	23
38	9.9626386	9.9970829	9.0655556	10.9344444	22
39	9.9637235	9.9970682	9.0666553	10.9333447	21
40	9.9648057	9.9970535	9.0677522	10.9322478	20
41	9.9658852	9.9970387	9.0688495	10.9311535	19
42	9.9669619	9.9970239	9.0699381	10.9300619	18
43	9.9680360	9.9970090	9.0710270	10.9289730	17
44	9.9691074	9.9969941	9.0721133	10.9278867	16
45	9.9701761	9.9969792	9.0731969	10.9268031	15
46	9.9712421	9.9969642	9.0742779	10.9257221	14
47	9.9723055	9.9969492	9.0753563	10.9246437	13
48	9.9733663	9.9969342	9.0764321	10.9235679	12
49	9.9744244	9.9969191	9.0775053	10.9224947	11
50	9.9754799	9.9969040	9.0785760	10.9214240	10
51	9.9765329	9.9968888	9.0796441	10.9203559	9
52	9.9775832	9.9968736	9.0807096	10.9192904	8
53	9.9786310	9.9968584	9.0817726	10.9182274	7
54	9.9796762	9.9968431	9.0828331	10.9171669	6
55	9.9807189	9.9968278	9.0838911	10.9161089	5
56	9.9817590	9.9968125	9.0849466	10.9150534	4
57	9.9827966	9.9967971	9.0859996	10.9140004	3
58	9.9838317	9.9967817	9.0870501	10.9129499	2
59	9.9848643	9.9967662	9.0880981	10.9119019	1
60	9.9858945	9.9967507	9.0891438	10.9108562	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

83 Degrees.

7 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.0858945	9.9967507	9.0891438	10.9108562	60
1	9.0869221	9.9967352	9.0901869	10.9098131	59
2	9.0879473	9.9967196	9.0912277	10.9087723	58
3	9.0889700	9.9967040	9.0922660	10.9077340	57
4	9.0899903	9.9966884	9.0933020	10.9066980	56
5	9.0810082	9.9966727	9.0943355	10.9056645	55
6	9.0920237	9.9966570	9.0953669	10.9046333	54
7	9.0930367	9.9966412	9.0963955	10.9036045	53
8	9.0940474	9.9966254	9.0974219	10.9025781	52
9	9.0950556	9.9966096	9.0984460	10.9015540	51
10	9.0960615	9.9965937	9.0994678	10.9005322	50
11	9.0970651	9.9965778	9.1004872	10.8995128	49
12	9.0980662	9.9965619	9.1015044	10.8984956	48
13	9.0990651	9.9965459	9.1025192	10.8974808	47
14	9.1000616	9.9965299	9.1035317	10.8964683	46
15	9.1010558	9.9965138	9.1045420	10.8954580	45
16	9.1020477	9.9964977	9.1055500	10.8944500	44
17	9.1030373	9.9964816	9.1065557	10.8934443	43
18	9.1040246	9.9964655	9.1075591	10.8924406	42
19	9.1050096	9.9964493	9.1085604	10.8914396	41
20	9.1059924	9.9964330	9.1095594	10.8904406	40
21	9.1069729	9.9964167	9.1105562	10.8894438	39
22	9.1079512	9.9964004	9.1115508	10.8884492	38
23	9.1089272	9.9963841	9.1125431	10.8874569	37
24	9.1099010	9.9963677	9.1135333	10.8864667	36
25	9.1108726	9.9963513	9.1145212	10.8854787	35
26	9.1118420	9.9963348	9.1155072	10.8844928	34
27	9.1128092	9.9963183	9.1164909	10.8835091	33
28	9.1137742	9.9963018	9.1174724	10.8825276	32
29	9.1147370	9.9962852	9.1184518	10.8815482	31
30	9.1156977	9.9962686	9.1194291	10.8805709	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

82 Degrees.

7 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.1156977	9.9962686	9.1194291	10.8803709	30
31	9.1166362	9.9962319	9.1204043	10.8795957	29
32	9.1176125	9.9962352	9.1213773	10.8786227	28
33	9.1185667	9.9962185	9.1223482	10.8776518	27
34	9.1195188	9.9962017	9.1233171	10.8766829	26
35	9.1204688	9.9961849	9.1242839	10.8757161	25
36	9.1214167	9.9961681	9.1252486	10.8747514	24
37	9.1223624	9.9961512	9.1262112	10.8737888	23
38	9.1233061	9.9961343	9.1271718	10.8728282	22
39	9.1242477	9.9961174	9.1281303	10.8718697	21
40	9.1251872	9.9961004	9.1290868	10.8709132	20
41	9.1261246	9.9960834	9.1300413	10.8699587	19
42	9.1270600	9.9960663	9.1309937	10.8690063	18
43	9.1279934	9.9960492	9.1319442	10.8680558	17
44	9.1289247	9.9960321	9.1328926	10.8671074	16
45	9.1298539	9.9960149	9.1338391	10.8661609	15
46	9.1307812	9.9959977	9.1347835	10.8652165	14
47	9.1317064	9.9959804	9.1357260	10.8642740	13
48	9.1326297	9.9959631	9.1366665	10.8633333	12
49	9.1335509	9.9959458	9.1376051	10.8623949	11
50	9.1344702	9.9959284	9.1385417	10.8614583	10
51	9.1353875	9.9959111	9.1394764	10.8605236	9
52	9.1363028	9.9958936	9.1404092	10.8595908	8
53	9.1372161	9.9958761	9.1413400	10.8586600	7
54	9.1381275	9.9958586	9.1422689	10.8577311	6
55	9.1390370	9.9958411	9.1431959	10.8568041	5
56	9.1399445	9.9958235	9.1441210	10.8558709	4
57	9.1408501	9.9958059	9.1450442	10.8549358	3
58	9.1417537	9.9957882	9.1459655	10.8540035	2
59	9.1426555	9.9957705	9.1468850	10.8531150	1
60	9.1435553	9.9957528	9.1478025	10.8521975	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	

82 Degrees.

8 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.1435553	9.9957528	9.1478025	10.8521975	60
1	9.1444532	9.9957350	9.1487182	10.8512818	59
2	9.1453493	9.9957172	9.1496321	10.8503679	58
3	9.1462435	9.9956993	9.1505441	10.8494559	57
4	9.1471358	9.9956815	9.1514543	10.8485457	56
5	9.1480262	9.9956635	9.1523627	10.8476373	55
6	9.1489148	9.9956456	9.1532692	10.8467308	54
7	9.1498015	9.9956276	9.1541739	10.8458261	53
8	9.1506864	9.9956095	9.1550769	10.8449231	52
9	9.1515694	9.9955915	9.1559780	10.8440220	51
10	9.1524507	9.9955734	9.1568773	10.8431227	50
11	9.1533301	9.9955552	9.1577748	10.8422252	49
12	9.1542076	9.9955370	9.1586706	10.8413294	48
13	9.1550834	9.9955188	9.1595646	10.8404354	47
14	9.1559574	9.9955005	9.1604569	10.8395431	46
15	9.1568296	9.9954822	9.1613473	10.8386527	45
16	9.1577000	9.9954639	9.1622361	10.8377639	44
17	9.1585686	9.9954455	9.1631231	10.8368769	43
18	9.1594354	9.9954271	9.1640083	10.8359917	42
19	9.1603005	9.9954087	9.1648919	10.8351081	41
20	9.1611639	9.9953902	9.1657737	10.8342263	40
21	9.1620254	9.9953717	9.1666538	10.8333462	39
22	9.1628853	9.9953531	9.1675322	10.8324678	38
23	9.1637434	9.9953345	9.1684089	10.8315911	37
24	9.1645998	9.9953159	9.1692839	10.8307161	36
25	9.1654544	9.9952972	9.1701572	10.8298428	35
26	9.1663074	9.9952785	9.1710289	10.8289711	34
27	9.1671586	9.9952597	9.1718989	10.8271311	33
28	9.1680081	9.9952409	9.1727672	10.8272028	32
29	9.1688559	9.9952221	9.1736338	10.8263662	31
30	9.1697021	9.9952033	9.1744988	10.8255912	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

81 Degrees.

8 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	
30	9.1697021	9.9952033	9.1744988	10.8255012	30
31	9.1705465	9.9951844	9.1753622	10.8246378	29
32	9.1713893	9.9951654	9.1762239	10.8237761	28
33	9.1722305	9.9951464	9.1770840	10.8229260	27
34	9.1730699	9.9951274	9.1779425	10.8220575	26
35	9.1739077	9.9951084	9.1787993	10.8212007	25
36	9.1747439	9.9950893	9.1796546	10.8203454	24
37	9.1755784	9.9950702	9.1805082	10.8194918	23
38	9.1764112	9.9950510	9.1813602	10.8186398	22
39	9.1772425	9.9950318	9.1822106	10.8177894	21
40	9.1780721	9.9950126	9.1830595	10.8169405	20
41	9.1789001	9.9949933	9.1839068	10.8160932	19
42	9.1797265	9.9949740	9.1847525	10.8152475	18
43	9.1805512	9.9949546	9.1855966	10.8144034	17
44	9.1813744	9.9949352	9.1864392	10.8135608	16
45	9.1821960	9.9949158	9.1872802	10.8127198	15
46	9.1830160	9.9948964	9.1881196	10.8118804	14
47	9.1838344	9.9948769	9.1889575	10.8110425	13
48	9.1846512	9.9948573	9.1897939	10.8102061	12
49	9.1854665	9.9948377	9.1906287	10.8093713	11
50	9.1862802	9.9948181	9.1914621	10.8085379	10
51	9.1870923	9.9947985	9.1922939	10.8077061	9
52	9.1879029	9.9947788	9.1931241	10.8068759	8
53	9.1887120	9.9947591	9.1939529	10.8060471	7
54	9.1895195	9.9947393	9.1947802	10.8052198	6
55	9.1903254	9.9947195	9.1956059	10.8043941	5
56	9.1911299	9.9946997	9.1964302	10.8035698	4
57	9.1919328	9.9946798	9.1972530	10.8027470	3
58	9.1927342	9.9946599	9.1980743	10.8019257	2
59	9.1935341	9.9946399	9.1988941	10.8011059	1
60	9.1943324	9.9946199	9.1997125	10.8002875	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

81 Degrees.

9 Degrees

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.1943324	9.9946199	9.1997125	10.8002875 60
1	9.1951293	9.9945999	9.2005294	10.7994706 59
2	9.1959247	9.9945798	9.2013449	10.7986551 58
3	9.1967186	9.9945597	9.2021588	10.7978411 57
4	9.1975110	9.9945396	9.2029714	10.7970286 56
5	9.1983019	9.9945194	9.2037825	10.7962175 55
6	9.1990913	9.9944992	9.2045922	10.7954078 54
7	9.1998793	9.9944789	9.2054004	10.7945996 53
8	9.2006658	9.9944587	9.2062072	10.7937928 52
9	9.2014509	9.9944383	9.2070126	10.7929874 51
10	9.2022345	9.9944180	9.2078165	10.7921835 50
11	9.2030167	9.9943975	9.2086191	10.7913809 49
12	9.2037974	9.9943771	9.2094203	10.7905797 48
13	9.2045766	9.9943566	9.2102200	10.7897800 47
14	9.2053545	9.9943361	9.2110184	10.7889816 46
15	9.2061309	9.9943156	9.2118153	10.7881847 45
16	9.2069059	9.9942950	9.2126109	10.7873891 44
17	9.2076795	9.9942743	9.2134051	10.7865949 43
18	9.2084516	9.9942537	9.2141980	10.7858020 42
19	9.2092224	9.9942330	9.2149894	10.7850106 41
20	9.2099917	9.9942122	9.2157795	10.7842205 40
21	9.2107597	9.9941914	9.2165683	10.7834317 39
22	9.2115263	9.9941706	9.2173556	10.7826444 38
23	9.2122914	9.9941498	9.2181417	10.7818583 37
24	9.2130552	9.9941289	9.2189264	10.7810736 36
25	9.2138176	9.9941079	9.2197097	10.7802903 35
26	9.2145787	9.9940870	9.2204917	10.7795083 34
27	9.2153384	9.9940659	9.2212724	10.7787276 33
28	9.2160967	9.9940449	9.2220518	10.7779482 32
29	9.2168536	9.9940238	9.2228298	10.7771702 31
30	9.2176092	9.9940027	9.2236065	10.7763935 30
Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

80 Degrees.

9 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.2176092	9.9940027	9.2236065	10.7763935	30
31	9.2183635	9.9939815	9.2243819	10.7756181	29
32	9.2191164	9.9939603	9.2251561	10.7748439	28
33	9.2198680	9.9939391	9.2259289	10.7740711	27
34	9.2206182	9.9939178	9.2267004	10.7732996	26
35	9.2213671	9.9938965	9.2274706	10.7725294	25
36	9.2221147	9.9938752	9.2282395	10.7717605	24
37	9.2228609	9.9938538	9.2290071	10.7709929	23
38	9.2236059	9.9938324	9.2297735	10.7702265	22
39	9.2243495	9.9938109	9.2305386	10.7694614	21
40	9.2250918	9.9937894	9.2313024	10.7686976	20
41	9.2258328	9.9937679	9.2310650	10.7679350	19
42	9.2265725	9.9937463	9.2318262	10.7671738	18
43	9.2273110	9.9937247	9.2325863	10.7664137	17
44	9.2280481	9.9937030	9.2333451	10.7656549	16
45	9.2287839	9.9936813	9.2341026	10.7648974	15
46	9.2295185	9.9936596	9.2348589	10.7641411	14
47	9.2302518	9.9936378	9.2356139	10.7633861	13
48	9.2309838	9.9936160	9.2363678	10.7626322	12
49	9.2317145	9.9935942	9.2371203	10.7618797	11
50	9.2324440	9.9935723	9.2378717	10.7611283	10
51	9.2331722	9.9935504	9.2386218	10.7603782	9
52	9.2338992	9.9935285	9.2393708	10.7596292	8
53	9.2346249	9.9935065	9.2401185	10.7588815	7
54	9.2353494	9.9934844	9.2408650	10.7581350	6
55	9.2360726	9.9934624	9.2416103	10.7573897	5
56	9.2367946	9.9934403	9.2423543	10.7566457	4
57	9.2375153	9.9934181	9.2430972	10.7559028	3
58	9.2382349	9.9933959	9.2438389	10.7551611	2
59	9.2389532	9.9933737	9.2445794	10.7544206	1
60	9.2396702	9.9933515	9.2453188	10.7536812	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

80 Degrees.

10. Degrees.

Minutes.

	Sine.	Sine Complement.	Tang.	Tangent Complement	
0	9.2396702	9.9933515	9.2463188	10.7536812	60
1	9.2403861	9.9933292	9.2470569	10.7529431	59
2	9.2411007	9.9933068	9.2477939	10.7522061	58
3	9.2418141	9.9932843	9.2485297	10.7514703	57
4	9.2425264	9.9932621	9.2492643	10.7507357	56
5	9.2432374	9.9932396	9.2499978	10.7500022	55
6	9.2439472	9.9932171	9.2507301	10.7492699	54
7	9.2446558	9.9931946	9.2514612	10.7485388	53
8	9.2453632	9.9931720	9.2521912	10.7478088	52
9	9.2460695	9.9931494	9.2529200	10.7470800	51
10	9.2467746	9.9931268	9.2536477	10.7463523	50
11	9.2474784	9.9931041	9.2543743	10.7456257	49
12	9.2481811	9.9930814	9.2550997	10.7449003	48
13	9.2488827	9.9930587	9.2558240	10.7441760	47
14	9.2495830	9.9930359	9.2565472	10.7434528	46
15	9.2502822	9.9930131	9.2572691	10.7427308	45
16	9.2509803	9.9929902	9.2579901	10.7420099	44
17	9.2516772	9.9929673	9.2587099	10.7412901	43
18	9.2523729	9.9929444	9.2594285	10.7405715	42
19	9.2530675	9.9929214	9.2601461	10.7398539	41
20	9.2537609	9.9928984	9.2608625	10.7391375	40
21	9.2544532	9.9928753	9.2615779	10.7384221	39
22	9.2551444	9.9928522	9.2622921	10.7377079	38
23	9.2558344	9.9928291	9.2630053	10.7369947	37
24	9.2565233	9.9928059	9.2637173	10.7362827	36
25	9.2572110	9.9927827	9.2644283	10.7355717	35
26	9.2578977	9.9927595	9.2651382	10.7348618	34
27	9.2585832	9.9927362	9.2658470	10.7341530	33
28	9.2592676	9.9927129	9.2665547	10.7334453	32
29	9.2599509	9.9926895	9.2672613	10.7327387	31
30	9.2606330	9.9926661	9.2679669	10.7320331	30
	Sine Complement.	Sine.	Tang. Complement.	Tang.	Minutes.

79 Degrees.

10 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
9.2606330	9.9925661	9.2579669	10.7320331
9.2613141	9.9926427	9.2686714	10.7313286
9.2619941	9.9926192	9.2693749	10.7306251
9.2626729	9.9925957	9.2700772	10.7299228
9.2633507	9.9925722	9.2707786	10.7292214
9.2640274	9.9925486	9.2714788	10.7285212
9.2647030	9.9925250	9.2721780	10.7278220
9.2653775	9.9925013	9.2728762	10.7271238
9.2660509	9.9924776	9.2735733	10.7264267
9.2667232	9.9924539	9.2742694	10.7257306
9.2673945	9.9924301	9.2749644	10.7250356
9.2680647	9.9924063	9.2756584	10.7243416
9.2687338	9.9923824	9.2763514	10.7236486
9.2694019	9.9923585	9.2770434	10.7229566
9.2700689	9.9923346	9.2777343	10.7222657
9.2707348	9.9923106	9.2784242	10.7215758
9.2713997	9.9922866	9.2791131	10.7208869
9.2720635	9.9922626	9.2798009	10.7201991
9.2727263	9.9922385	9.2804878	10.7195122
9.2733880	9.9922144	9.2811736	10.7188264
9.2740487	9.9921902	9.2818585	10.7181415
9.2747083	9.9921660	9.2825423	10.7174577
9.2753669	9.9921418	9.2832251	10.7167749
9.2760245	9.9921175	9.2839070	10.7160930
9.2766811	9.9920932	9.2845878	10.7154122
9.2773366	9.9920689	9.2852677	10.7147323
9.2779911	9.9920445	9.2859466	10.7140534
9.2786445	9.9920201	9.2866245	10.7133755
9.2792970	9.9919955	9.2873014	10.7126986
9.2799484	9.9919711	9.2879773	10.7120227
9.2805988	9.9919466	9.2886523	10.7113477
Sine Complem.	Sine.	Tang. Complem.	Tang.

79 Degrees.

II Degrees.

Minutes.	Sine.	Sine Complement.	Tang.	Tangent Complement.	Minutes.
0	9.2805988	9.9919466	9.2886523	10.7113477	60
1	9.2812483	9.9919220	9.2893253	10.7106737	59
2	9.2818967	9.9918974	9.2899993	10.7100007	58
3	9.2825441	9.9918727	9.2906713	10.7093287	57
4	9.2831905	9.9918480	9.2913424	10.7086576	56
5	9.2838359	9.9918233	9.2920126	10.7079874	55
6	9.2844803	9.9917986	9.2926817	10.7073183	54
7	9.2851237	9.9917737	9.2933500	10.7066500	53
8	9.2857661	9.9917489	9.2940172	10.7059828	52
9	9.2864076	9.9917240	9.2946836	10.7053164	51
10	9.2870480	9.9916991	9.2953489	10.7046511	50
11	9.2876875	9.9916741	9.2960134	10.7039866	49
12	9.2883260	9.9916492	9.2966769	10.7033231	48
13	9.2889636	9.9916241	9.2973395	10.7026605	47
14	9.2896001	9.9915990	9.2980011	10.7019989	46
15	9.2902357	9.9915739	9.2986618	10.7013382	45
16	9.2908704	9.9915488	9.2993216	10.7006784	44
17	9.2915040	9.9915236	9.2999804	10.7000196	43
18	9.2921367	9.9914984	9.3006383	10.6993617	42
19	9.2927685	9.9914731	9.3012954	10.6987046	41
20	9.2933993	9.9914478	9.3019514	10.6980486	40
21	9.2940291	9.9914225	9.3026066	10.6973934	39
22	9.2946580	9.9913971	9.3032609	10.6967391	38
23	9.2952859	9.9913717	9.3039143	10.6960857	37
24	9.2959129	9.9913462	9.3045667	10.6954333	36
25	9.2965390	9.9913207	9.3052183	10.6947817	35
26	9.2971641	9.9912952	9.3058689	10.6941311	34
27	9.2977883	9.9912696	9.3065187	10.6934813	33
28	9.2984116	9.9912440	9.3071675	10.6928325	32
29	9.2990339	9.9912184	9.3078155	10.6921845	31
30	9.2996553	9.9911927	9.3084626	10.6915374	30
	Sine Complement.	Sine.	Tang. Complement.	Tang.	

78 Degrees.

11 Degrees.

Minutes	Sine.	Sine Complem.	Tang.	Tangent Complemen.	Minutes
30	9.2996553	9.9911927	9.3084626	10.6915374	30
31	9.3002758	9.9911670	9.3091088	10.6908912	29
32	9.3008953	9.9911412	9.3097541	10.6902459	28
33	9.3015140	9.9911154	9.3103985	10.6896015	27
34	9.3021317	9.9910896	9.3110421	10.6889579	26
35	9.3027485	9.9910637	9.3116848	10.6883152	25
36	9.3033644	9.9910378	9.3123266	10.6876734	24
37	9.3039794	9.9910119	9.3129675	10.6870325	23
38	9.3045934	9.9909859	9.3136076	10.6863924	22
39	9.3052066	9.9909598	9.3142468	10.6857532	21
40	9.3058189	9.9909338	9.3148851	10.6851149	20
41	9.3064303	9.9909077	9.3155226	10.6844774	19
42	9.3070407	9.9908815	9.3161592	10.6838408	18
43	9.3076503	9.9908553	9.3167950	10.6832050	17
44	9.3082590	9.9908291	9.3174299	10.6825701	16
45	9.3088668	9.9908029	9.3180640	10.6819360	15
46	9.3094737	9.9907766	9.3186972	10.6813028	14
47	9.3100798	9.9907502	9.3193295	10.6806705	13
48	9.3106849	9.9907239	9.3199611	10.6800389	12
49	9.3112892	9.9906974	9.3205918	10.6794082	11
50	9.3118926	9.9906710	9.3212216	10.6787784	10
51	9.3124951	9.9906445	9.3218506	10.6781494	9
52	9.3130968	9.9906180	9.3224788	10.6775212	8
53	9.3136976	9.9905914	9.3231061	10.6768939	7
54	9.3142975	9.9905648	9.3237327	10.6762673	6
55	9.3148965	9.9905382	9.3243584	10.6756416	5
56	9.3154947	9.9905115	9.3249832	10.6750168	4
57	9.3160921	9.9904848	9.3256073	10.6743927	3
58	9.3166885	9.9904580	9.3262305	10.6737695	2
59	9.3172841	9.9904312	9.3268529	10.6731471	1
60	9.3178789	9.9904044	9.3274745	10.6725255	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

78 Degrees.

12 Degrees.				
Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.3178789	9.9904044	9.3274745	10.672525560
1	9.3184728	9.9903775	9.3280953	10.671904759
2	9.3190659	9.9903506	9.3287153	10.671284758
3	9.3196581	9.9903237	9.3293345	10.670665557
4	9.3202495	9.9902967	9.3299528	10.670047256
5	9.3208400	9.9902697	9.3305704	10.669429655
6	9.3214297	9.9902426	9.3311872	10.668812854
7	9.3220186	9.9902155	9.3318031	10.668196953
8	9.3226066	9.9901883	9.3324183	10.667581752
9	9.3231938	9.9901612	9.3330327	10.666967351
10	9.3237802	9.9901339	9.3336463	10.666353750
11	9.3243657	9.9901067	9.3342591	10.665740949
12	9.3249505	9.9900794	9.3348711	10.665128948
13	9.3255344	9.9900521	9.3354823	10.664517747
14	9.3261174	9.9900247	9.3360927	10.663907346
15	9.3266997	9.9899973	9.3367024	10.663297645
16	9.3272811	9.9899698	9.3373113	10.662688744
17	9.3278617	9.9899423	9.3379194	10.662080643
18	9.3284416	9.9899148	9.3385267	10.661473342
19	9.3290206	9.9898873	9.3391333	10.660866741
20	9.3295988	9.9898597	9.3397391	10.660260940
21	9.3301761	9.9898320	9.3403441	10.659655939
22	9.3307527	9.9898043	9.3409484	10.659051638
23	9.3313285	9.9897766	9.3415519	10.658444837
24	9.3319035	9.9897489	9.3421546	10.657844436
25	9.3324777	9.9897211	9.3427566	10.657243435
26	9.3330511	9.9896932	9.3433578	10.656642234
27	9.3336237	9.9896654	9.3439583	10.656041733
28	9.3341955	9.9896374	9.3445580	10.655442032
29	9.3347665	9.9896095	9.3451570	10.654843031
30	9.3353368	9.9895815	9.3457552	10.654244830
	Sine Complem.	Sine.	Tangent Complem.	Tang.
77 Degrees.				

12 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complemen.	Minutes.
30	9.3353368	9.9895815	9.3457552	10.6542448	30
31	9.3359062	9.9895535	9.3463527	10.6536473	29
32	9.3364749	9.9895254	9.3469494	10.6530506	28
33	9.3370428	9.9894973	9.3475454	10.6524546	27
34	9.3376099	9.9894692	9.3481407	10.6518593	26
35	9.3381762	9.9894410	9.3487352	10.6512648	25
36	9.3387418	9.9894128	9.3493290	10.6506710	24
37	9.3393065	9.9893845	9.3499220	10.6500780	23
38	9.3398706	9.9893562	9.3505143	10.6494857	22
39	9.3404338	9.9893279	9.3511059	10.6488941	21
40	9.3409963	9.9892995	9.3516968	10.6483032	20
41	9.3415580	9.9892711	9.3522869	10.6477131	19
42	9.3421190	9.9892427	9.3528763	10.6471237	18
43	9.3426792	9.9892142	9.3534650	10.6465350	17
44	9.3432386	9.9891856	9.3540530	10.6459470	16
45	9.3437973	9.9891571	9.3546402	10.6453598	15
46	9.3443552	9.9891285	9.3552267	10.6447733	14
47	9.3449124	9.9890998	9.3558126	10.6441874	13
48	9.3454688	9.9890711	9.3563977	10.6436023	12
49	9.3460245	9.9890424	9.3569821	10.6430179	11
50	9.3465794	9.9890137	9.3575658	10.6424342	10
51	9.3471336	9.9889849	9.3581407	10.6418513	9
52	9.3476870	9.9889560	9.3587310	10.6412690	8
53	9.3482397	9.9889271	9.3593126	10.6406874	7
54	9.3487917	9.9888982	9.3598935	10.6401065	6
55	9.3493429	9.9888693	9.3604736	10.6395264	5
56	9.3498934	9.9888403	9.3610531	10.6389469	4
57	9.3504432	9.9888113	9.3616319	10.6383681	3
58	9.3509922	9.9887822	9.3622100	10.6377900	2
59	9.3515405	9.9887531	9.3627874	10.6372126	1
60	9.3520880	9.9887239	9.3633641	10.6366359	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

77 Degrees.

13 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.3520880	9.9887239	9.3633641	10.6366359
1	9.3526349	9.9886947	9.3639401	10.6360599
2	9.3531810	9.9886655	9.3645155	10.6354845
3	9.3537264	9.9886363	9.3650901	10.6349099
4	9.3542710	9.9886070	9.3656641	10.6343359
5	9.3548150	9.9885776	9.3662374	10.6337626
6	9.3553582	9.9885482	9.3668100	10.6331900
7	9.3559007	9.9885188	9.3673819	10.6326181
8	9.3564426	9.9884894	9.3679532	10.6320468
9	9.3569836	9.9884599	9.3685238	10.6314762
10	9.3575240	9.9884303	9.3690937	10.6309063
11	9.3580637	9.9884008	9.3696629	10.6303371
12	9.3586027	9.9883712	9.3702315	10.6297685
13	9.3591409	9.9883415	9.3707994	10.6292006
14	9.3596785	9.9883118	9.3713667	10.6286333
15	9.3602154	9.9882821	9.3719333	10.6280667
16	9.3607515	9.9882523	9.3724992	10.6275008
17	9.3612870	9.9882225	9.3730645	10.6269355
18	9.3618217	9.9881927	9.3736291	10.6263709
19	9.3623558	9.9881628	9.3741930	10.6258070
20	9.3628892	9.9881329	9.3747563	10.6252437
21	9.3634219	9.9881029	9.3753190	10.6246810
22	9.3639539	9.9880729	9.3758810	10.6241190
23	9.3644852	9.9880429	9.3764423	10.6235577
24	9.3650158	9.9880128	9.3770030	10.6229970
25	9.3655458	9.9879827	9.3775631	10.6224369
26	9.3660750	9.9879525	9.3781225	10.6218775
27	9.3666036	9.9879223	9.3786813	10.6213187
28	9.3671315	9.9878921	9.3792394	10.6207606
29	9.3676587	9.9878618	9.3797969	10.6202031
30	9.3681853	9.9878315	9.3803537	10.6196463
	Sine Complem.	Sine.	Tangent Complem.	Tang.

76 Degrees.

Minutes.

13 Degrees.

	Minutes	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes
60	0	9.3681853	9.9878315	9.3803537	10.6196463	30
59	1	9.3687111	9.9878012	9.3809100	10.6190900	29
58	2	9.3692363	9.9877708	9.3814655	10.6185345	28
57	3	9.3697608	9.9877404	9.3820205	10.6179795	27
56	4	9.3702847	9.9877099	9.3825748	10.6174252	26
55	5	9.3708079	9.9876794	9.3831285	10.6168715	25
54	6	9.3713304	9.9876488	9.3836816	10.6163184	24
53	7	9.3718523	9.9876183	9.3842340	10.6157660	23
52	8	9.3723735	9.9875876	9.3847858	10.6152142	22
51	9	9.3728940	9.9875570	9.3853370	10.6146630	21
50	10	9.3734139	9.9875263	9.3858876	10.6141124	20
49	11	9.3739331	9.9874955	9.3864376	10.6135624	19
48	12	9.3744517	9.9874648	9.3869869	10.6130131	18
47	13	9.3749696	9.9874339	9.3875356	10.6124644	17
46	14	9.3754868	9.9874031	9.3880837	10.6119163	16
45	15	9.3760034	9.9873722	9.3886312	10.6113688	15
44	16	9.3765194	9.9873413	9.3891781	10.6108219	14
43	17	9.3770347	9.9873103	9.3897244	10.6102756	13
42	18	9.3775493	9.9872793	9.3902700	10.6097300	12
41	19	9.3780633	9.9872482	9.3908151	10.6091849	11
40	20	9.3785767	9.9872171	9.3913595	10.6086405	10
39	21	9.3790894	9.9871860	9.3919034	10.6080966	9
38	22	9.3796015	9.9871549	9.3924466	10.6075534	8
37	23	9.3801129	9.9871236	9.3929893	10.6070107	7
36	24	9.3806237	9.9870924	9.3935313	10.6064687	6
35	25	9.3811339	9.9870611	9.3940727	10.6059273	5
34	26	9.3816434	9.9870298	9.3946136	10.6053864	4
33	27	9.3821523	9.9869984	9.3951538	10.6048462	3
32	28	9.3826605	9.9869670	9.3956935	10.6043065	2
31	29	9.3831682	9.9869356	9.3962326	10.6037674	1
30	30	9.3836752	9.9869041	9.3967711	10.6032289	0
		Sine Complem.	Sine.	Tangent Complem.	Tang.	

76 Degrees.

14 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.3836752	9.9869041	9.3967711	10.6032289	60
1	9.3841815	9.9868726	9.3973089	10.6026911	59
2	9.3846873	9.9868410	9.3978463	10.6021537	58
3	9.3851924	9.9868094	9.3983830	10.6016170	57
4	9.3855969	9.9867778	9.3989191	10.6010809	56
5	9.3862008	9.9867461	9.3994547	10.6005453	55
6	9.3867040	9.9867144	9.3999896	10.6000104	54
7	9.3872057	9.9866827	9.4005240	10.5994760	53
8	9.3877087	9.9866509	9.4010578	10.5989422	52
9	9.3882101	9.9866191	9.4015910	10.5984090	51
10	9.3887109	9.9865872	9.4021247	10.5978763	50
11	9.3892111	9.9865553	9.4026558	10.5973442	49
12	9.3897106	9.9865233	9.4031873	10.5968127	48
13	9.3902096	9.9864913	9.4037182	10.5962818	47
14	9.3907079	9.9864593	9.4042486	10.5957514	46
15	9.3912057	9.9864273	9.4047784	10.5952216	45
16	9.3917028	9.9863952	9.4053076	10.5946924	44
17	9.3921993	9.9863630	9.4058363	10.5941637	43
18	9.3926952	9.9863308	9.4063644	10.5936356	42
19	9.3931905	9.9862986	9.4068919	10.5931081	41
20	9.3936852	9.9862663	9.4074189	10.5925810	40
21	9.3941794	9.9862340	9.4079453	10.5920547	39
22	9.3946729	9.9862017	9.4084712	10.5915288	38
23	9.3951658	9.9861693	9.4089955	10.5910035	37
24	9.3956581	9.9861369	9.4095212	10.5904788	36
25	9.3961499	9.9861045	9.4100454	10.5899546	35
26	9.3966410	9.9860720	9.4105690	10.5894310	34
27	9.3971315	9.9860394	9.4110921	10.5889079	33
28	9.3976215	9.9860069	9.4116146	10.5883854	32
29	9.3981109	9.9859742	9.4121366	10.5878634	31
30	9.3985996	9.9859416	9.4126581	10.5873419	30
	Sine. Complem.	Sine.	Tangent Complem.	Tang.	

75 Degrees.

14 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.3985996	9.9859416	9.4126581	10.5873419	30
31	9.3990878	9.9859089	9.4131789	10.5868211	29
32	9.3995754	9.9858762	9.4136993	10.5863007	28
33	9.4000625	9.9858434	9.4142191	10.5857809	27
34	9.4005489	9.9858106	9.4147383	10.5852617	26
35	9.4010348	9.9857777	9.4152570	10.5847430	25
36	9.4015201	9.9857449	9.4157752	10.5842248	24
37	9.4020048	9.9857119	9.4162928	10.5837072	23
38	9.4024889	9.9856790	9.4168099	10.5831901	22
39	9.4029734	9.9856460	9.4173265	10.5826735	21
40	9.4034554	9.9856129	9.4178425	10.5821575	20
41	9.4039378	9.9855798	9.4183580	10.5816420	19
42	9.4044196	9.9855467	9.4188729	10.5811271	18
43	9.4049009	9.9855135	9.4193874	10.5806126	17
44	9.4053816	9.9854803	9.4199013	10.5800987	16
45	9.4058617	9.9854471	9.4204146	10.5795854	15
46	9.4063413	9.9854138	9.4209275	10.5790725	14
47	9.4068203	9.9853805	9.4214398	10.5785602	13
48	9.4072987	9.9853471	9.4219515	10.5780485	12
49	9.4077766	9.9853138	9.4224628	10.5775372	11
50	9.4082539	9.9852803	9.4229735	10.5770265	10
51	9.4087306	9.9852468	9.4234838	10.5765162	9
52	9.4092068	9.9852133	9.4239935	10.5760065	8
53	9.4096824	9.9851798	9.4245026	10.5754974	7
54	9.4101575	9.9851462	9.4250113	10.5749887	6
55	9.4106320	9.9851125	9.4255194	10.5744806	5
56	9.4111059	9.9850789	9.4260271	10.5739729	4
57	9.4115793	9.9850452	9.4265342	10.5734658	3
58	9.4120522	9.9840114	9.4270408	10.5729592	2
59	9.4125245	9.9849776	9.4275469	10.5724531	1
60	9.4129962	9.9849438	9.4280525	10.5719475	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	

75 Degrees.

15 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.4129962	9.9849438	9.4280525	10.5719475 60
1	9.4134674	9.9849099	9.4285575	10.5714425 59
2	9.4139381	9.9848760	9.4290621	10.5709379 58
3	9.4144082	9.9848420	9.4295661	10.5704339 57
4	9.4148778	9.9848081	9.4300697	10.5699303 56
5	9.4153466	9.9847740	9.4305727	10.5694273 55
6	9.4158152	9.9847400	9.4310753	10.5689247 54
7	9.4162832	9.9847059	9.4315773	10.5684227 53
8	9.4167506	9.9846717	9.4320789	10.5679211 52
9	9.4172174	9.9846375	9.4325799	10.5674201 51
10	9.4176837	9.9846033	9.4330804	10.5669196 50
11	9.4181495	9.9845690	9.4335805	10.5664195 49
12	9.4186148	9.9845347	9.4340800	10.5659200 48
13	9.4190795	9.9845004	9.4345791	10.5654209 47
14	9.4195436	9.9844660	9.4350776	10.5649224 46
15	9.4200073	9.9844316	9.4355757	10.5644243 45
16	9.4204704	9.9843971	9.4360733	10.5639267 44
17	9.4209330	9.9843626	9.4365704	10.5634296 43
18	9.4213950	9.9843281	9.4370670	10.5629330 42
19	9.4218566	9.9842935	9.4375631	10.5624369 41
20	9.4223176	9.9842589	9.4380587	10.5619413 40
21	9.4227780	9.9842242	9.4385538	10.5614462 39
22	9.4232380	9.9841895	9.4390485	10.5609515 38
23	9.4236974	9.9841548	9.4395426	10.5604574 37
24	9.4241563	9.9841200	9.4400363	10.5599637 36
25	9.4246147	9.9840852	9.4405295	10.5594705 35
26	9.4250726	9.9840503	9.4410222	10.5589778 34
27	9.4255299	9.9840154	9.4415145	10.5584855 33
28	9.4259867	9.9839805	9.4420062	10.5579938 32
29	9.4264430	9.9839455	9.4424975	10.5575025 31
30	9.4268988	9.9839105	9.4429883	10.5570117 30
	Sine Complem.	Sine.	Tangent Complem.	Tang.

74 Degrees.

Minutes.

15 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
	Sine Complem.	Sine	Tangent Complem.	Tang.	
30	9.4268988	9.9839105	9.4429883	10.5570117	30
31	9.4273541	9.9838755	9.4434786	10.5565214	29
32	9.4278089	9.9838404	9.4439685	10.5560315	28
33	9.4282631	9.9838052	9.4444579	10.5555421	27
34	9.4287169	9.9837701	9.4449468	10.5550532	26
35	9.4291701	9.9837348	9.4454352	10.5545648	25
36	9.4396228	9.9836696	9.4459232	10.5540768	24
37	9.4300750	9.9836643	9.4464107	10.5535893	23
38	9.4305267	9.9836290	9.4468978	10.5531022	22
39	9.4309779	9.9835936	9.4473843	10.5526157	21
40	9.4314286	9.9835582	9.4478704	10.5521296	20
41	9.4318788	9.9835227	9.4483561	10.5516439	19
42	9.4323285	9.9834872	9.4488413	10.5511587	18
43	9.4327777	9.9834517	9.4493260	10.5506740	17
44	9.4332264	9.9834161	9.4498102	10.5501898	16
45	9.4336746	9.9833805	9.4502940	10.5497060	15
46	9.4341223	9.9833449	9.4507774	10.5492226	14
47	9.4345694	9.9833092	9.4512602	10.5487398	13
48	9.4350161	9.9832735	9.4517427	10.5482573	12
49	9.4354623	9.9832377	9.4522246	10.5477754	11
50	9.4359080	9.9832019	9.4527061	10.5472939	10
51	9.4363532	9.9831661	9.4531872	10.5468128	9
52	9.4367980	9.9831302	9.4536678	10.5463322	8
53	9.4372422	9.9830942	9.4541479	10.5458521	7
54	9.4376859	9.9830583	9.4546276	10.5453724	6
55	9.4381292	9.9830223	9.4551069	10.5448931	5
56	9.4385719	9.9829862	9.4555857	1.05444143	4
57	9.4390142	9.9829501	9.4560641	1.05439359	3
58	9.4394560	9.9829140	9.4565420	1.05434580	2
59	9.4398973	9.9828778	9.4570194	1.05429806	1
60	9.4403381	9.9828416	9.4574964	1.05425036	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	

74 Degrees.

16 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.4403381	9.9828416	9.4574964	10.5425036	60
1	9.4407784	9.9828054	9.4579730	10.5420270	59
2	9.4412182	9.9827691	9.4584491	10.5415509	58
3	9.4416576	9.9827328	9.4589248	10.5410752	57
4	9.4420965	9.9826964	9.4594001	10.5405999	56
5	9.4425349	9.9826600	9.4598749	10.5401251	55
6	9.4429728	9.9826236	9.4603492	10.5396508	54
7	9.4434103	9.9825871	9.4608232	10.5391768	53
8	9.4438472	9.9825506	9.4612967	10.5387033	52
9	9.4442837	9.9825140	9.4617697	10.5382303	51
10	9.4447197	9.9824774	9.4622423	10.5377577	50
11	9.4451553	9.9824408	9.4627145	10.5372855	49
12	9.4455904	9.9824041	9.4631863	10.5368137	48
13	9.4460250	9.9823674	9.4636576	10.5363424	47
14	9.4464591	9.9823306	9.4641285	10.5358715	46
15	9.4468927	9.9822938	9.4645990	10.5354010	45
16	9.4473259	9.9822569	9.4650690	10.5349310	44
17	9.4477586	9.9822201	9.4655386	10.5344614	43
18	9.4481909	9.9821831	9.4660078	10.5339922	42
19	9.4486227	9.9821462	9.4664765	10.5335235	41
20	9.4490540	9.9821092	9.4669448	10.5330552	40
21	9.4494849	9.9820721	9.4674127	10.5325873	39
22	9.4499153	9.9820351	9.4678802	10.5321198	38
23	9.4503452	9.9819979	9.4683473	10.5316527	37
24	9.4507747	9.9819608	9.4688139	10.5311861	36
25	9.4512037	9.9819236	9.4692801	10.5307199	35
26	9.4516322	9.9818863	9.4697459	10.5302541	34
27	9.4520603	9.9818490	9.4702112	10.5297888	33
28	9.4524879	9.9818117	9.4706762	10.5293238	32
29	9.4529151	9.9817744	9.4711407	10.5288593	31
30	9.4533418	9.9817370	9.4716046	10.5283952	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

73 Degrees.

16 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.4533418	9.9817370	9.4716048	10.5283952	30
31	9.4537681	9.9816995	9.4720685	10.5279315	29
32	9.4541939	9.9816620	9.4725318	10.5274682	28
33	9.4546192	9.9816245	9.4729947	10.5270053	27
34	9.4550441	9.9815870	9.4734571	10.5265428	26
35	9.4554686	9.9815494	9.4739192	10.5260808	25
36	9.4558926	9.9815117	9.4743808	10.5256192	24
37	9.4563161	9.9814740	9.4748421	10.5251579	23
38	9.4567392	9.9814363	9.4753029	10.5246971	22
39	9.4571618	9.9813986	9.4757633	10.5242367	21
40	9.4575840	9.9813608	9.4762233	10.5237767	20
41	9.4580058	9.9813229	9.4766829	10.5233171	19
42	9.4584271	9.9812850	9.4771421	10.5228579	18
43	9.4588480	9.9812471	9.4776009	10.5223991	17
44	9.4592684	9.9812091	9.4780592	10.5219408	16
45	9.4596884	9.9811711	9.4785172	10.5214828	15
46	9.4601079	9.9811331	9.4789748	10.5210252	14
47	9.4605270	9.9810950	9.4794319	10.5205681	13
48	9.4609456	9.9810569	9.4798887	10.5201113	12
49	9.4613638	9.9810187	9.4803451	10.5196549	11
50	9.4617816	9.9809805	9.4808011	10.5191989	10
51	9.4621989	9.9809423	9.4812566	10.5187434	9
52	9.4626158	9.9809040	9.4817118	10.5182882	8
53	9.4630323	9.9808657	9.4821666	10.5178334	7
54	9.4634483	9.9808273	9.4826210	10.5173790	6
55	9.4638639	9.9807889	9.4830750	10.5169250	5
56	9.4642790	9.9807505	9.4835286	10.5164714	4
57	9.4646938	9.9807120	9.4839818	10.5160182	3
58	9.4651081	9.9806735	9.4844346	10.5155654	2
59	9.4655219	9.9806349	9.4848879	10.5151130	1
60	9.4659353	9.9805963	9.4853390	10.5146610	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

73 Degrees.

17 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.4659353	9.9805963	9.4853390	10.5146610	60
1	9.4663483	9.9805577	9.4857907	10.5142093	59
2	9.4667609	9.9805190	9.4862415	10.5137581	58
3	9.4671730	9.9804803	9.4866928	10.5133072	57
4	9.4675848	9.9804415	9.4871433	10.5128567	56
5	9.4679960	9.9804027	9.4875933	10.5124067	55
6	9.4684069	9.9803639	9.4880430	10.5119570	54
7	9.4688173	9.9803250	9.4884924	10.5115076	53
8	9.4692273	9.9802860	9.4889413	10.5110587	52
9	9.4696369	9.9802471	9.4893898	10.5106102	51
10	9.4700461	9.9802081	9.4898380	10.5101620	50
11	9.4704548	9.9801690	9.4902858	10.5097142	49
12	9.4708631	9.9801299	9.4907332	10.5092668	48
13	9.4712710	9.9800908	9.4911802	10.5088198	47
14	9.4716785	9.9800516	9.4916269	10.5083731	46
15	9.4720856	9.9800124	9.4920731	10.5079269	45
16	9.4724922	9.9799732	9.4925190	10.5074810	44
17	9.4728985	9.9799339	9.4929646	10.5070354	43
18	9.4733043	9.9798946	9.4934097	10.5065903	42
19	9.4737097	9.9798552	9.4938545	10.5061455	41
20	9.4741146	9.9798158	9.4942988	10.5057012	40
21	9.4745192	9.9797764	9.4947429	10.5052571	39
22	9.4749234	9.9797369	9.4951865	10.5048135	38
23	9.4753271	9.9796973	9.4956298	10.5043702	37
24	9.4757304	9.9796578	9.4960727	10.5039273	36
25	9.4761334	9.9796182	9.4965152	10.5034848	35
26	9.4765359	9.9795785	9.4969574	10.5030426	34
27	9.4769380	9.9795388	9.4973991	10.5026009	33
28	9.4773396	9.9794991	9.4978406	10.5021594	32
29	9.4777409	9.9794593	9.4982816	10.5017184	31
30	9.4781418	9.9794195	9.4987223	10.5012777	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

72 Degree s

17 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.4781418	9.9794195	9.4987223	10.5012777	30
31	9.4785423	9.9793796	9.4991626	10.5008374	29
32	9.4789423	9.9793398	9.4996026	10.5003974	28
33	9.4793420	9.9792998	9.5000422	10.4999578	27
34	9.4797412	9.9792599	9.5004814	10.4995186	26
35	9.4801401	9.9792198	9.5009203	10.4990797	25
36	9.4805385	9.9791798	9.5013588	10.4986412	24
37	9.4809366	9.9791397	9.5017969	10.4982031	23
38	9.4813342	9.9790996	9.5022347	10.4977653	22
39	9.4817315	9.9790594	9.5026721	10.4973279	21
40	9.4821283	9.9790192	9.5031092	10.4968908	20
41	9.4825248	9.9789789	9.5035459	10.4964541	19
42	9.4829208	9.9789386	9.5039822	10.4960178	18
43	9.4833165	9.9788983	9.5044182	10.4955818	17
44	9.4837117	9.9788579	9.5048538	10.4951462	16
45	9.4841066	9.9788175	9.5052891	10.4947109	15
46	9.4845010	9.9787770	9.5057240	10.4942760	14
47	9.4848951	9.9787365	9.5061686	10.4938414	13
48	9.4852888	9.9786960	9.5066128	10.4934072	12
49	9.4856820	9.9786554	9.5070567	10.4929733	11
50	9.4860749	9.9786148	9.5074602	10.4925398	10
51	9.4864674	9.9785741	9.5078933	10.4921067	9
52	9.4868595	9.9785334	9.5083261	10.4916739	8
53	9.4872512	9.9784927	9.5087586	10.4912414	7
54	9.4876426	9.9784519	9.5091907	10.4908093	6
55	9.4880335	9.9784111	9.5096224	10.4903776	5
56	9.4884240	9.9783702	9.5100539	10.4899461	4
57	9.4888142	9.9783293	9.5104849	10.4895151	3
58	9.4892040	9.9782883	9.5109156	10.4890844	2
59	9.4895934	9.9782474	9.5113460	10.4886540	1
60	9.4899824	9.9782063	9.5117760	10.4882240	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

72 Degrees.

18 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.4899824	9.9782063	9.5117760	10.4882140	60
1	9.4903710	9.9781653	9.5122057	10.4877943	59
2	9.4907592	9.9781241	9.5126351	10.4873649	58
3	9.4911471	9.9780830	9.5130641	10.4869359	57
4	9.4915345	9.9780418	9.5134927	10.4865073	56
5	9.4919216	9.9780006	9.5139210	10.4860790	55
6	9.4923083	9.9779593	9.5143490	10.4856510	54
7	9.4926946	9.9779180	9.5147766	10.4852234	53
8	9.4930806	9.9778766	9.5152039	10.4847961	52
9	9.4934661	9.9778353	9.5156309	10.4843691	51
10	9.4938513	9.9777938	9.5160575	10.4839425	50
11	9.4942361	9.9777523	9.5164838	10.4835162	49
12	9.4946205	9.9777108	9.5169097	10.4830903	48
13	9.4950046	9.9776693	9.5173353	10.4826647	47
14	9.4953883	9.9776277	9.5177606	10.4822394	46
15	9.4957716	9.9775860	9.5181855	10.4818145	45
16	9.4961545	9.9775444	9.5186101	10.4813895	44
17	9.4965370	9.9775026	9.5190344	10.4809656	43
18	9.4969192	9.9774609	9.5194583	10.4805417	42
19	9.4973010	9.9774191	9.5198819	10.4801181	41
20	9.4976824	9.9773772	9.5203052	10.4796948	40
21	9.4980635	9.9773354	9.5207282	10.4792718	39
22	9.4984442	9.9772934	9.5211508	10.4788492	38
23	9.4988245	9.9772515	9.5215730	10.4784270	37
24	9.4992045	9.9772095	9.5219950	10.4780050	36
25	9.4995840	9.9771674	9.5224166	10.4775834	35
26	9.4999632	9.9771253	9.5228379	10.4771621	34
27	9.5003421	9.9770832	9.5232589	10.4767411	33
28	9.5007206	9.9770410	9.5236795	10.4763205	32
29	9.5010987	9.9769988	9.5240999	10.4759001	31
30	9.5014764	9.9769566	9.5245199	10.4754801	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

71 Degrees.

18 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement.
9.5014764	9.9769566	9.5245199	10.4774801
9.5018544	9.9769143	9.5249395	10.4770605
9.5022308	9.9768720	9.5253589	10.4766411
9.5026075	9.9768296	9.5257779	10.4762221
9.5029838	9.9767872	9.5261966	10.4758034
9.5033597	9.9767447	9.5266150	10.4753850
9.5037353	9.9767022	9.5270321	10.4749669
9.5041105	9.9766597	9.5274508	10.4745492
9.5044853	9.9766171	9.5278682	10.4741318
9.5048598	9.9765745	9.5282853	10.4737147
9.5052339	9.9765318	9.5287021	10.4732979
9.5056077	9.9764891	9.5291186	10.4728814
9.5059811	9.9764464	9.5295347	10.4724653
9.5063542	9.9764036	9.5299505	10.4720495
9.5067269	9.9763608	9.5303661	10.4716339
9.5070992	9.9763179	9.5307813	10.4712187
9.5074712	9.9762750	9.5311961	10.4708039
9.5078428	9.9762321	9.5316107	10.4703893
9.5082141	9.9761891	9.5320250	10.4700750
9.5085850	9.9761461	9.5324389	10.4697611
9.5089556	9.9761030	9.5328526	10.4694474
9.5093258	9.9760599	9.5332659	10.4691341
9.5096956	9.9760167	9.5336789	10.4688211
9.5100651	9.9759735	9.5340916	10.4685084
9.5104343	9.9759303	9.5345040	10.4681960
9.5108031	9.9758870	9.5349161	10.4678839
9.5111716	9.9758437	9.5353278	10.4675723
9.5115397	9.9758004	9.5357393	10.4672607
9.5119074	9.9757570	9.5361505	10.4669495
9.5122749	9.9757135	9.5365613	10.4666387
9.5126419	9.9756701	9.5369715	10.4663281
Sine. Complement.	Sine.	Tang. Complement.	Tang.

19 Degress.

Sine.	Sine Complem.	Tang.	Tang. Complem.
09.51264199	9.9756701	9.5359718	10.4630281
19.51300869	9.9756265	9.5373821	10.4626179
29.51337509	9.9755830	9.5377920	10.4622080
39.51374109	9.9755394	9.5382017	10.4617983
49.51410679	9.9754957	9.5386110	10.4613886
59.51447219	9.9754521	9.5390200	10.4609800
69.51483719	9.9754083	9.5394287	10.4605722
79.51520179	9.9753646	9.5398371	10.4601629
89.51556609	9.9753208	9.5402453	10.4597547
99.51593009	9.9752769	9.5406531	10.4593469
109.51629369	9.9752330	9.5410606	10.4589394
119.51665699	9.9751891	9.5414678	10.4585322
129.51701989	9.9751451	9.5418747	10.4581253
139.51738249	9.9751011	9.5422813	10.4577187
149.51774479	9.9750507	9.5426877	10.4573123
159.51810669	9.9750129	9.5430937	10.4569061
169.51846829	9.9749688	9.5434994	10.4565000
179.51882959	9.9749246	9.5439048	10.4560951
189.51919049	9.9748804	9.5443100	10.4556902
199.51955109	9.9748361	9.5447148	10.4552853
209.51991129	9.9747918	9.5451193	10.4548807
219.52027119	9.9747475	9.5455236	10.4544763
229.52063079	9.9747031	9.5459276	10.4540721
239.52098999	9.9746587	9.5463312	10.4536682
249.52134889	9.9746142	9.5467346	10.4532644
259.52170749	9.9745697	9.5471377	10.4528609
269.52206569	9.9745252	9.5475405	10.4524575
279.52242359	9.9744808	9.5479430	10.4520543
289.52278119	9.9744359	9.5483452	10.4516513
299.52313839	9.9743913	9.5487471	10.4512485
309.52349539	9.9743466	9.5491487	10.4508459
Sine Complem.	Sine.	Tangent Complem.	Tang.

70 Degress.

19 Degrées.

Minutes	Sine	Sine Complém.	Tang.	Tang. Complém.	Minutes
10	9.5234955	9.97743466	9.5291237	10.45087629	10
11	9.5238528	9.97730187	9.5295500	10.45044999	11
12	9.5242081	9.97716270	9.5299712	10.45002878	12
13	9.5245620	9.97701722	9.5303879	10.44961217	13
14	9.5249148	9.97686573	9.5307993	10.44920077	14
15	9.5252749	9.97670824	9.5312056	10.44879458	15
16	9.5256298	9.97654474	9.5316069	10.44839369	16
17	9.5259842	9.97637524	9.5320032	10.44800019	17
18	9.5263387	9.97620073	9.5323945	10.44761428	18
19	9.5266927	9.97602122	9.5327808	10.44723597	19
20	9.5270463	9.97583671	9.5331621	10.44686526	20
21	9.5273997	9.97564719	9.5335384	10.44650315	21
22	9.5277526	9.97545267	9.5339109	10.44614964	22
23	9.5281053	9.97525319	9.5342784	10.44580473	23
24	9.5284577	9.97504871	9.5346419	10.44546842	24
25	9.5288097	9.97483929	9.5350013	10.44514071	25
26	9.5291614	9.97462485	9.5353567	10.44482160	26
27	9.5295128	9.97440541	9.5357081	10.44451109	27
28	9.5298638	9.97418097	9.5360555	10.44420918	28
29	9.5302140	9.97395153	9.5364009	10.44391587	29
30	9.5305640	9.97371709	9.5367433	10.44363116	30
31	9.5309131	9.97347765	9.5370817	10.44335505	31
32	9.5312619	9.97323321	9.5374161	10.44308754	32
33	9.5316103	9.97298377	9.5377465	10.44282863	33
34	9.5319583	9.97272933	9.5380729	10.44257832	34
35	9.5323059	9.97247089	9.5383953	10.44233661	35
36	9.5326530	9.97220745	9.5387137	10.44210350	36
37	9.5330000	9.97193901	9.5390281	10.44187899	37
38	9.5333469	9.97166557	9.5393385	10.44166308	38
39	9.5336934	9.97138713	9.5396449	10.44145577	39
40	9.5340391	9.97110369	9.5399473	10.44125706	40
41	9.5343841	9.97081525	9.5402457	10.44106695	41
42	9.5347281	9.97052181	9.5405391	10.44088544	42
43	9.5350718	9.97022337	9.5408285	10.44071253	43
44	9.5354151	9.96991993	9.5411139	10.44054822	44
45	9.5357579	9.96961149	9.5413953	10.44039251	45
46	9.5361002	9.96929805	9.5416727	10.44024540	46
47	9.5364420	9.96897961	9.5419461	10.44010689	47
48	9.5367833	9.96865617	9.5422155	10.44000000	48
49	9.5371241	9.96832773	9.5424809	10.43990471	49
50	9.5374644	9.96799429	9.5427423	10.43982002	50
51	9.5378042	9.96765585	9.5430007	10.43973593	51
52	9.5381435	9.96731241	9.5432551	10.43965244	52
53	9.5384823	9.96696397	9.5435055	10.43956955	53
54	9.5388206	9.96661053	9.5437519	10.43948726	54
55	9.5391584	9.96625209	9.5440003	10.43940557	55
56	9.5394957	9.96588865	9.5442447	10.43932448	56
57	9.5398325	9.96552021	9.5444851	10.43924399	57
58	9.5401688	9.96514677	9.5447215	10.43916410	58
59	9.5405046	9.96476833	9.5449539	10.43908481	59
60	9.5408399	9.96438489	9.5451823	10.43900612	60
	Sine. Complém.	Sine.	Tang. Complém.	Tang.	Minutes.

70 Degrées.

20 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement.
9.5340512	9.9729988	9.5610012	10.4389988
12.5343986	9.9726014	9.5614588	10.4385412
22.5347452	9.9722039	9.5618515	10.4381485
32.5350919	9.9718477	9.5622439	10.4377561
42.5354379	9.9714806	9.5626360	10.4373640
52.5357832	9.9711254	9.5630278	10.4369722
62.5361286	9.9707702	9.5634194	10.4365806
72.5364737	9.9704150	9.5638107	10.4361892
82.5368184	9.9700606	9.5642018	10.4357982
92.5371628	9.9697063	9.5645925	10.4354075
102.5375069	9.9693529	9.5649831	10.4350169
112.5378502	9.9689994	9.5653733	10.4346267
122.5381943	9.9686459	9.5657633	10.4342367
132.5385379	9.9682923	9.5661530	10.4338470
142.5388808	9.9679388	9.5665424	10.4334576
152.5392230	9.9675851	9.5669316	10.4330684
162.5395655	9.9672314	9.5673205	10.4326795
172.5399073	9.9668777	9.5677091	10.4322909
182.5402489	9.9665239	9.5680975	10.4319025
192.5405903	9.9661699	9.5684856	10.4315144
202.5409314	9.9658159	9.5688735	10.4311265
212.5412721	9.9654618	9.5692611	10.4307389
222.5416126	9.9651076	9.5696484	10.4303516
232.5419527	9.9647533	9.5700355	10.4299645
242.5422926	9.9643989	9.5704223	10.4295777
252.5426321	9.9640444	9.5708088	10.4291912
262.5429713	9.9636899	9.5711951	10.4288049
272.5433108	9.9633353	9.5715811	10.4284189
282.5436489	9.9629807	9.5719669	10.4280331
292.5439873	9.9626261	9.5723524	10.4276476
302.5443253	9.9622715	9.5727377	10.4272623
Sine Complement.	Sine.	Tangent Complement.	Tang.

69 Degrees.

20 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement.
9.5443233	9.9715836	9.5727577	10.4272623
9.5446630	9.9715404	9.5731227	10.4268773
9.5450009	9.9714931	9.5735074	10.4264926
9.5453376	9.9714457	9.5738919	10.4261081
9.5456745	9.9713984	9.5742761	10.4257239
9.5460110	9.9713509	9.5746601	10.4253399
9.5463478	9.9713035	9.5750438	10.4249562
9.5466832	9.9712560	9.5754272	10.4245728
9.5470189	9.9712084	9.5758104	10.4241896
9.5473542	9.9711608	9.5761934	10.4238066
9.5476893	9.9711132	9.5765763	10.4234239
9.5480240	9.9710655	9.5769589	10.4230415
9.5483585	9.9710178	9.5773407	10.4226595
9.5486927	9.9709701	9.5777226	10.4222774
9.5490266	9.9709223	9.5781043	10.4218957
9.5493602	9.9708744	9.5784858	10.4215146
9.5496935	9.9708265	9.5788669	10.4211331
9.5500265	9.9707786	9.5792479	10.4207521
9.5503592	9.9707306	9.5796286	10.4203714
9.5506916	9.9706826	9.5800090	10.4199910
9.5510237	9.9706346	9.5803892	10.4196108
9.5513556	9.9705865	9.5807691	10.4192309
9.5516871	9.9705383	9.5811488	10.4188512
9.5520184	9.9704902	9.5815282	10.4184718
9.5523494	9.9704419	9.5819074	10.4180926
9.5526801	9.9703937	9.5822864	10.4177136
9.5530105	9.9703454	9.5826651	10.4173349
9.5533406	9.9702970	9.5830435	10.4169565
9.5536704	9.9702486	9.5834217	10.4165783
9.5539999	9.9702002	9.5837997	10.4162003
9.5543292	9.9701517	9.5841774	10.4158226
Sine Complement.	Sine.	Tangent Complement.	Tang.

69 Degrees.

21 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement.
09.5343203	9.0701517	9.5842774	10.4158226
10.5306581	9.0701022	9.5845349	10.4154451
20.5349868	9.0700547	9.5849321	10.4150479
30.5353152	9.0700061	9.5853092	10.4146909
40.5356438	9.0699574	9.5856859	10.4143141
50.5359711	9.0699087	9.5860624	10.4139376
60.5362987	9.0698600	9.5864386	10.4135614
70.5366259	9.0698112	9.5868147	10.4131853
80.5369529	9.0697624	9.5871904	10.4128090
90.5372769	9.0697136	9.5875660	10.4124325
100.5376060	9.0696647	9.5879413	10.4120587
110.5379321	9.0696158	9.5883163	10.4116837
120.5382579	9.0695668	9.5886912	10.4113084
130.5385825	9.0695177	9.5890657	10.4109339
140.5389082	9.0694687	9.5894401	10.4105599
150.5392322	9.0694196	9.5898142	10.4101870
160.5395558	9.0693704	9.5901881	10.4098119
170.5398829	9.0693212	9.5905617	10.4094389
180.5602071	9.0692720	9.5909351	10.4090645
190.5605310	9.0692227	9.5913082	10.4086911
200.5608546	9.0691734	9.5916812	10.4083180
210.5611779	9.0691240	9.5920539	10.4079461
220.5615010	9.0690746	9.5924263	10.4075737
230.5618227	9.0690252	9.5927985	10.4072019
240.5621462	9.0689757	9.5931705	10.4068295
250.5624685	9.0689262	9.5935422	10.4064571
260.5627904	9.0688766	9.5939138	10.4060862
270.5631121	9.0688270	9.5942851	10.4057149
280.5634335	9.0687773	9.5946561	10.4053439
290.5637546	9.0687276	9.5950269	10.4049731
300.5640754	9.0686779	9.5953975	10.4046025
Sine Complement.	Sine.	Tangent Complement.	Tang.

68 Degrees.

21 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
9.5640754	9.9686779	9.5953975	10.4046025
9.5643960	9.9686281	9.5957679	10.4042321
9.5647163	9.9685783	9.5961380	10.4038620
9.5650363	9.9685284	9.5965079	10.4034921
9.5653561	9.9684785	9.5968776	10.4031224
9.5656756	9.9684286	9.5972470	10.4027530
9.5659948	9.9683786	9.5976162	10.4023838
9.5663137	9.9683285	9.5979852	10.4020148
9.5666324	9.9682784	9.5983540	10.4016460
9.5669508	9.9682283	9.5987225	10.4012775
9.5672689	9.9681781	9.5990908	10.4009092
9.5675868	9.9681279	9.5994588	10.4005411
9.5679044	9.9680777	9.5998267	10.4001733
9.5682217	9.9680274	9.6001943	10.3998057
9.5685387	9.9679771	9.6005617	10.3994383
9.5688555	9.9679267	9.6009289	10.3990711
9.5691721	9.9678763	9.6012958	10.3987042
9.5694883	9.9678258	9.6016625	10.3983375
9.5698043	9.9677753	9.6020290	10.3979710
9.5701200	9.9677247	9.6023953	10.3976047
9.5704355	9.9676741	9.6027613	10.3972387
9.5707506	9.9676235	9.6031271	10.3968729
9.5710656	9.9675728	9.6034927	10.3965073
9.5713802	9.9675221	9.6038581	10.3961419
9.5716946	9.9674713	9.6042233	10.3957767
9.5720087	9.9674205	9.6045882	10.3954118
9.5723226	9.9673697	9.6049529	10.3950471
9.5726362	9.9673188	9.6053174	10.3946826
9.5729495	9.9672679	9.6056817	10.3943183
9.5732626	9.9672169	9.6060457	10.3939543
9.5735754	9.9671659	9.6064096	10.3935904
Sine Complem.	Sine.	Tangent Complem.	Tang.

68 Degrees.

22 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
09.5735754	9.9671659	9.6064066	10.3935904
19.5738880	9.9671148	9.6067732	10.3932268
29.5742003	9.9670637	9.6071366	10.3928634
39.5745123	9.9670125	9.6074997	10.3925003
49.5748240	9.9669614	9.6078627	10.3921373
59.5751356	9.9669101	9.6082254	10.3917745
69.5754468	9.9668588	9.6085880	10.3914120
79.5757578	9.9668075	9.6089503	10.3910497
89.5760685	9.9667562	9.6093124	10.3906875
99.5763790	9.9667048	9.6096742	10.3903253
109.5766892	9.9666533	9.6100359	10.3899641
119.5769991	9.9666018	9.6103973	10.3896027
129.5773088	9.9665503	9.6107586	10.3892414
139.5776182	9.9664987	9.6111196	10.3888802
149.5779275	9.9664471	9.6114804	10.3885190
159.5782364	9.9663954	9.6118409	10.3881579
169.5785450	9.9663437	9.6122013	10.3877967
179.5788533	9.9662920	9.6125613	10.3874354
189.5791616	9.9662402	9.6129214	10.3870742
199.5794695	9.9661884	9.6132812	10.3867130
209.5797772	9.9661365	9.6136407	10.3863518
219.5800845	9.9660846	9.6140000	10.3860000
229.5803917	9.9660326	9.6143591	10.3856409
239.5806986	9.9659806	9.6147180	10.3852820
249.5810052	9.9659285	9.6150766	10.3849234
259.5813116	9.9658764	9.6154351	10.3845649
269.5816177	9.9658243	9.6157934	10.3842066
279.5819236	9.9657721	9.6161514	10.3838483
289.5822292	9.9657199	9.6165093	10.3834907
299.5825345	9.9656677	9.6168669	10.3831331
309.5828397	9.9656153	9.6172243	10.3827757
Sine Complem.	Sine.	Tangent Complem.	Tang.

67 Degrees.

Minutes.

22 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.5828397	9.9656153	9.6172243	10.3827757	30
31	9.5834445	9.9655555	9.6175875	10.3824125	29
32	9.5834491	9.9655106	9.6179385	10.3820615	28
33	9.5837535	9.9654582	9.6182953	10.3817047	27
34	9.5840576	9.9654057	9.6186519	10.3813481	26
35	9.5843613	9.9653532	9.6190083	10.3809917	25
36	9.5846651	9.9653006	9.6193645	10.3806355	24
37	9.5849685	9.9652480	9.6197205	10.3802793	23
38	9.5852716	9.9651953	9.6200768	10.3799238	22
39	9.5855745	9.9651426	9.6204318	10.3795683	21
40	9.5858771	9.9650899	9.6207872	10.3792128	20
41	9.5861795	9.9650371	9.6211423	10.3788577	19
42	9.5864816	9.9649843	9.6214973	10.3785027	18
43	9.5867835	9.9649314	9.6218520	10.3781480	17
44	9.5870851	9.9648785	9.6222066	10.3777934	16
45	9.5873865	9.9648256	9.6225609	10.3774391	15
46	9.5876876	9.9647726	9.6229150	10.3770850	14
47	9.5879883	9.9647195	9.6232690	10.3767310	13
48	9.5882892	9.9646663	9.6236227	10.3763773	12
49	9.5885896	9.9646133	9.6239763	10.3760237	11
50	9.5888897	9.9645602	9.6243296	10.3756704	10
51	9.5891897	9.9645069	9.6246827	10.3753173	9
52	9.5894893	9.9644537	9.6250356	10.3749644	8
53	9.5897888	9.9644004	9.6253884	10.3746116	7
54	9.5900880	9.9643470	9.6257409	10.3742591	6
55	9.5903869	9.9642937	9.6260932	10.3739068	5
56	9.5906856	9.9642402	9.6264454	10.3735546	4
57	9.5909841	9.9641868	9.6267973	10.3732027	3
58	9.5912823	9.9641332	9.6271491	10.3728509	2
59	9.5915803	9.9640797	9.6275006	10.3724994	1
60	9.5918780	9.9640261	9.6278519	10.3721481	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

67 Degrees.

23 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
09.5918780	9.9640261	9.6278519	10.3721481
19.5921755	9.9639724	9.6282031	10.3717969
29.5924728	9.9639187	9.6285540	10.3714460
39.5927698	9.9638650	9.6289048	10.3710952
49.5930666	9.9638112	9.6292553	10.3707447
59.5933631	9.9637574	9.6296057	10.3703943
69.5936594	9.9637036	9.6299558	10.3700442
79.5939555	9.9636496	9.6303058	10.3696942
89.5942513	9.9635957	9.6306556	10.3693444
99.5944469	9.9635417	9.6310052	10.3689946
109.5948432	9.9634877	9.6313545	10.3686450
119.5951273	9.9634336	9.6317037	10.3682955
129.5954122	9.9633795	9.6320527	10.3679473
139.5957268	9.9633253	9.6324015	10.3675985
149.5960212	9.9632711	9.6327501	10.3672499
159.5963154	9.9632168	9.6330985	10.3669015
169.5966093	9.9631625	9.6334468	10.3665532
179.5969030	9.9631082	9.6337948	10.3662050
189.5971965	9.9630538	9.6341426	10.3658574
199.5974896	9.9629994	9.6344903	10.3655097
209.5977827	9.9629449	9.6348378	10.3651622
219.5980754	9.9628904	9.6351850	10.3648150
229.5983579	9.9628358	9.6355321	10.3644679
239.5986602	9.9627819	9.6358790	10.3641210
249.5989523	9.9627266	9.6352257	10.3637743
259.5992411	9.9626719	9.6355722	10.3634278
269.5995357	9.9626172	9.6359185	10.3630815
279.5998271	9.9625624	9.6372646	10.3627354
289.6001181	9.9625076	9.6376106	10.3623894
299.6004090	9.9624527	9.6379563	10.3620437
309.6006997	9.9623978	9.6383019	10.3616981

Sine
Complem.

Sine.

Tangent
Complem.

Tang.

66 Degrees.

of inches.

22 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.6006997	9.9623978	9.6383019	10.3616981	30
31	9.6009901	9.9623428	9.6386473	10.3613527	31
32	9.6012803	9.9622878	9.6389923	10.3610073	32
33	9.6015703	9.9622328	9.6393375	10.3606625	33
34	9.6018600	9.9621777	9.6396823	10.3603177	34
35	9.6021495	9.9621226	9.6400269	10.3599731	35
36	9.6024388	9.9620674	9.6403714	10.3596286	36
37	9.6027278	9.9620122	9.6407156	10.3592844	37
38	9.6030166	9.9619569	9.6410597	10.3589403	38
39	9.6033052	9.9619016	9.6414036	10.3585964	39
40	9.6035936	9.9618463	9.6417473	10.3582527	40
41	9.6038817	9.9617909	9.6420908	10.3579092	41
42	9.6041696	9.9617355	9.6424342	10.3575658	42
43	9.6044573	9.9616800	9.6427773	10.3572227	43
44	9.6047448	9.9616245	9.6431203	10.3568797	44
45	9.6050320	9.9615689	9.6434631	10.3565365	45
46	9.6053190	9.9615133	9.6438057	10.3561943	46
47	9.6056057	9.9614576	9.6441481	10.3558519	47
48	9.6058923	9.9614020	9.6444903	10.3555097	48
49	9.6061786	9.9613463	9.6448324	10.3551676	49
50	9.6064647	9.9612904	9.6451743	10.3548257	50
51	9.6067506	9.9612346	9.6455160	10.3544840	51
52	9.6070362	9.9611787	9.6458575	10.3541425	52
53	9.6073216	9.9611228	9.6461988	10.3538012	53
54	9.6076068	9.9610668	9.6465400	10.3534600	54
55	9.6078918	9.9610108	9.6468810	10.3531190	55
56	9.6081765	9.9609548	9.6472217	10.3527783	56
57	9.6084611	9.9608987	9.6475624	10.3524376	57
58	9.6087454	9.9608426	9.6479028	10.3520972	58
59	9.6090294	9.9607864	9.6482431	10.3517569	59
60	9.6093133	9.9607302	9.6485831	10.3514169	60
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

66 Degrees.

24 Degrees.

Minutes.	Sine.	Sine Complement.	Tang.	Tangent Complement.
0	9.6093123	9.9607302	9.6485831	10.3514169
1	9.6095969	9.9606739	9.6489230	10.3510870
2	9.6098803	9.9606176	9.6492628	10.3507372
3	9.6101635	9.9605612	9.6496023	10.3503977
4	9.6104465	9.9605048	9.6499417	10.3500583
5	9.6107293	9.9603484	9.6502809	10.3497191
6	9.6110118	9.9603919	9.6506199	10.3493801
7	9.6112942	9.9603354	9.6509587	10.3490413
8	9.6115762	9.9602788	9.6512974	10.3487026
9	9.6118580	9.9602222	9.6516359	10.3483641
10	9.6121397	9.9601655	9.6519742	10.3480258
11	9.6124211	9.9601088	9.6523123	10.3476877
12	9.6127023	9.9600520	9.6526503	10.3473497
13	9.6129833	9.9599952	9.6529881	10.3470119
14	9.6132641	9.9599384	9.6533257	10.3466743
15	9.6135446	9.9598815	9.6536631	10.3463369
16	9.6138250	9.9598246	9.6540004	10.3459996
17	9.6141051	9.9597676	9.6543375	10.3456625
18	9.6143850	9.9597106	9.6546744	10.3453256
19	9.6146647	9.9596535	9.6550112	10.3449888
20	9.6149441	9.9595964	9.6553477	10.3446523
21	9.6152234	9.9595393	9.6555841	10.3443159
22	9.6155024	9.9594821	9.6559204	10.3439796
23	9.6157812	9.9594248	9.6562564	10.3436436
24	9.6160598	9.9593675	9.6565923	10.3433077
25	9.6163382	9.9593102	9.6569280	10.3429725
26	9.6166164	9.9592528	9.6572636	10.3426364
27	9.6168944	9.9591954	9.6575989	10.3423011
28	9.6171721	9.9591380	9.6579341	10.3419659
29	9.6174496	9.9590805	9.6582692	10.3416308
30	9.6177270	9.9590229	9.6587041	10.3412960
	Sine Complement.	Sine.	Tangent Complement.	Tang.

65 Degrees.

Minutes.

64. Degrees.

Sine.	Sine Complem.	Tang.	Tangent. Complem.	Minutes.
09.6177270	9.9590229	9.6587041	10.3412960	30
10.6180041	9.9589653	9.6590387	10.3409613	29
11.6182809	9.9589077	9.6593733	10.3406267	28
12.6185576	9.9588500	9.6597076	10.3402924	27
13.6188341	9.9587923	9.6600418	10.3399582	26
14.6191103	9.9587345	9.6603758	10.3396242	25
15.6193864	9.9586767	9.6607097	10.3392903	24
16.6196622	9.9586188	9.6610434	10.3389566	23
17.6199378	9.9585609	9.6613769	10.3386231	22
18.6202132	9.9585030	9.6617103	10.3382897	21
19.6204884	9.9584450	9.6620434	10.3379566	20
20.6207634	9.9583869	9.6623765	10.3376235	19
21.6210384	9.9583288	9.6627093	10.3372907	18
22.6213127	9.9582707	9.6630420	10.3369580	17
23.6215871	9.9582125	9.6633745	10.3366253	16
24.6218612	9.9581543	9.6637069	10.3362931	15
25.6221351	9.9580961	9.6640391	10.3359609	14
26.6224088	9.9580378	9.6643711	10.3356289	13
27.6226824	9.9579794	9.6647036	10.3352970	12
28.6229557	9.9579210	9.6650356	10.3349654	11
29.6232287	9.9578626	9.6653662	10.3346338	10
30.6235016	9.9578041	9.6656975	10.3343025	9
31.6237743	9.9577456	9.6660288	10.3339712	8
32.6240467	9.9576870	9.6663598	10.3336402	7
33.6243190	9.9576284	9.6666907	10.3333093	6
34.6245911	9.9575697	9.6670214	10.3329786	5
35.6248629	9.9575110	9.6673519	10.3326481	4
36.6251346	9.9574522	9.6676823	10.3323177	3
37.6254060	9.9573934	9.6680126	10.3319874	2
38.6256772	9.9573346	9.6683426	10.3316574	1
39.6256483	9.9572757	9.6686725	10.3313275	0
Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

65. Degrees.

25 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.6259483	9.9572757	9.6686715	10.3313275
1	9.6262191	9.9572168	9.6690023	10.3309977
2	9.6264897	9.9571578	9.6693319	10.3306682
3	9.6267601	9.9570988	9.6696613	10.3303387
4	9.6270303	9.9570397	9.6699906	10.3300094
5	9.6273003	9.9569806	9.6703197	10.3296803
6	9.6275701	9.9569215	9.6706486	10.3293514
7	9.6278397	9.9568623	9.6709774	10.3290226
8	9.6281090	9.9568030	9.6713060	10.3286940
9	9.6283782	9.9567437	9.6716345	10.3283655
10	9.6286472	9.9566844	9.6719628	10.3280372
11	9.6289160	9.9566250	9.6722910	10.3277090
12	9.6291845	9.9565656	9.6726190	10.3273810
13	9.6294529	9.9565061	9.6729468	10.3270532
14	9.6297211	9.9564466	9.6732745	10.3267256
15	9.6299890	9.9563870	9.6736020	10.3263980
16	9.6302568	9.9563274	9.6739294	10.3260706
17	9.6305243	9.9562678	9.6742566	10.3257434
18	9.6307917	9.9562081	9.6745836	10.3254164
19	9.6310589	9.9561483	9.6749105	10.3250895
20	9.6313248	9.9560886	9.6752372	10.3247628
21	9.6315926	9.9560287	9.6755638	10.3244362
22	9.6318591	9.9559689	9.6758902	10.3241097
23	9.6321255	9.9559089	9.6762165	10.3237833
24	9.6323916	9.9558490	9.6765426	10.3234570
25	9.6326576	9.9557890	9.6768686	10.3231308
26	9.6329233	9.9557289	9.6771944	10.3228048
27	9.6331889	9.9556688	9.6775201	10.3224789
28	9.6334542	9.9556087	9.6778456	10.3221532
29	9.6337194	9.9555485	9.6781709	10.3218276
30	9.6339844	9.9554882	9.6784961	10.3215020
	Sine Complem.	Sine.	Tangent. Complem.	Tang.

64 Degrees.

25 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement.	Minutes.
30 9.6339844	9.9554882	9.6788231	10.3211789	30
31 9.6341491	9.9554280	9.6788231	10.3211789	29
32 9.6343137	9.9553676	9.6788231	10.3211789	28
33 9.6344780	9.9553073	9.6788231	10.3211789	27
34 9.6346422	9.9552469	9.6788231	10.3211789	26
35 9.6348062	9.9551864	9.6788231	10.3211789	25
36 9.6349709	9.9551259	9.6788231	10.3211789	24
37 9.6351353	9.9550653	9.6788231	10.3211789	23
38 9.6352996	9.9550047	9.6788231	10.3211789	22
39 9.6354636	9.9549441	9.6788231	10.3211789	21
40 9.6356273	9.9548834	9.6788231	10.3211789	20
41 9.6357919	9.9548227	9.6788231	10.3211789	19
42 9.6359564	9.9547619	9.6788231	10.3211789	18
43 9.6361208	9.9547011	9.6788231	10.3211789	17
44 9.6362851	9.9546403	9.6788231	10.3211789	16
45 9.6364493	9.9545795	9.6788231	10.3211789	15
46 9.6366136	9.9545184	9.6788231	10.3211789	14
47 9.6367778	9.9544574	9.6788231	10.3211789	13
48 9.6369419	9.9543963	9.6788231	10.3211789	12
49 9.6371060	9.9543352	9.6788231	10.3211789	11
50 9.6372701	9.9542741	9.6788231	10.3211789	10
51 9.6374342	9.9542129	9.6788231	10.3211789	9
52 9.6375983	9.9541517	9.6788231	10.3211789	8
53 9.6377624	9.9540904	9.6788231	10.3211789	7
54 9.6379265	9.9540291	9.6788231	10.3211789	6
55 9.6380906	9.9539677	9.6788231	10.3211789	5
56 9.6382547	9.9539063	9.6788231	10.3211789	4
57 9.6384188	9.9538448	9.6788231	10.3211789	3
58 9.6385829	9.9537833	9.6788231	10.3211789	2
59 9.6387470	9.9537218	9.6788231	10.3211789	1
60 9.6389111	9.9536602	9.6788231	10.3211789	0
Sine Complement.	Sine.	Tangent Complement.	Tang.	Minutes.

64 Degrees. 55

26 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.6418420	9.9526602	9.6881818	10.3118182
1	9.6421009	9.9535985	9.6885023	10.3114977
2	9.6423596	9.9535369	9.6888227	10.3111773
3	9.6426182	9.9534751	9.6891430	10.3108570
4	9.6428769	9.9534134	9.6894631	10.3105369
5	9.6431347	9.9533515	9.6897831	10.3102169
6	9.6433926	9.9532897	9.6901030	10.3098970
7	9.6436504	9.9532278	9.6904226	10.3095774
8	9.6439080	9.9531658	9.6907422	10.3092578
9	9.6441654	9.9531038	9.6910616	10.3089384
10	9.6444226	9.9530418	9.6913809	10.3086191
11	9.6446796	9.9529797	9.6917000	10.3083000
12	9.6449365	9.9529175	9.6920189	10.3079811
13	9.6451931	9.9528553	9.6923378	10.3076622
14	9.6454496	9.9527931	9.6926565	10.3073435
15	9.6457058	9.9527308	9.6929750	10.3070250
16	9.6459619	9.9526685	9.6932934	10.3067066
17	9.6462178	9.9526061	9.6936117	10.3063883
18	9.6464735	9.9525437	9.6939298	10.3060702
19	9.6467290	9.9524813	9.6942478	10.3057522
20	9.6469844	9.9524188	9.6945656	10.3054344
21	9.6472393	9.9523562	9.6948833	10.3051167
22	9.6474945	9.9522936	9.6952005	10.3047991
23	9.6477493	9.9522310	9.6955183	10.3044817
24	9.6480038	9.9521683	9.6958355	10.3041645
25	9.6482582	9.9521055	9.6961527	10.3038473
26	9.6485124	9.9520428	9.6964699	10.3035303
27	9.6487665	9.9519799	9.6967865	10.3032135
28	9.6490203	9.9519171	9.6971032	10.3028968
29	9.6492740	9.9518541	9.6974198	10.3025802
30	9.6495274	9.9517912	9.6977363	10.3022637
	Sine Complem.	Sine.	Tangent Complem.	Tang.

63 Degrees.

26 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complemen.	Minutes.
30	9.6495274	9.9517912	9.6977363	10.3022637	30
31	9.6497807	9.9517282	9.6980526	10.3019474	29
32	9.6500338	9.9516651	9.6983687	10.3016313	28
33	9.6502868	9.9516020	9.6986847	10.3013153	27
34	9.6505395	9.9515389	9.6990006	10.3009994	26
35	9.6507920	9.9514757	9.6993164	10.3006836	25
36	9.6510444	9.9514124	9.6996320	10.3003680	24
37	9.6512966	9.9513492	9.6999474	10.3000526	23
38	9.6515486	9.9512858	9.7002628	10.2997372	22
39	9.6518004	9.9512224	9.7005780	10.2994220	21
40	9.6520521	9.9511590	9.7008930	10.2991070	20
41	9.6523035	9.9510956	9.7012080	10.2987920	19
42	9.6525548	9.9510320	9.7015227	10.2984773	18
43	9.6528059	9.9509685	9.7018374	10.2981626	17
44	9.6530568	9.9509049	9.7021519	10.2978481	16
45	9.6533075	9.9508412	9.7024663	10.2975337	15
46	9.6535581	9.9507775	9.7027805	10.2972195	14
47	9.6538084	9.9507138	9.7030946	10.2969054	13
48	9.6540586	9.9506500	9.7034086	10.2965914	12
49	9.6543086	9.9505861	9.7037225	10.2962775	11
50	9.6545584	9.9505223	9.7040362	10.2959638	10
51	9.6548081	9.9504583	9.7043497	10.2956503	9
52	9.6550575	9.9503944	9.7046632	10.2953368	8
53	9.6553068	9.9503303	9.7049765	10.2950235	7
54	9.6555555	9.9502663	9.7052897	10.2947103	6
55	9.6558048	9.9502022	9.7056027	10.2943973	5
56	9.6560530	9.9501380	9.7059156	10.2940844	4
57	9.6563021	9.9500738	9.7062284	10.2937716	3
58	9.6565505	9.9500095	9.7065410	10.2934590	2
59	9.6567987	9.9499452	9.7068535	10.2931455	1
60	9.6570468	9.9498809	9.7071655	10.2928341	0
	Sine Comp'em.	Sine.	Tangent Complem.	Tang.	

63 Degrees.

27. Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.6570468	9.9498809	9.7071659	10.2928341
1	9.6572946	9.9498165	9.7074781	10.2925219
2	9.6575423	9.9497521	9.7077902	10.2922098
3	9.6577898	9.9496876	9.7081022	10.2918978
4	9.6580371	9.9496230	9.7084141	10.2915859
5	9.6582842	9.9495585	9.7087258	10.2912742
6	9.6585312	9.9494938	9.7090374	10.2909620
7	9.6587787	9.9494292	9.7093488	10.2906512
8	9.6590246	9.9493645	9.7096601	10.2903399
9	9.6592710	9.9492997	9.7099713	10.2900287
10	9.6595173	9.9492349	9.7102824	10.2897176
11	9.6597634	9.9491700	9.7105933	10.2894067
12	9.6600093	9.9491051	9.7109041	10.2890959
13	9.6602550	9.9490402	9.7112148	10.2887852
14	9.6605005	9.9489752	9.7115254	10.2884746
15	9.6607459	9.9489101	9.7118358	10.2881642
16	9.6609911	9.9488450	9.7121461	10.2878539
17	9.6612361	9.9487799	9.7124562	10.2875438
18	9.6614810	9.9487147	9.7127662	10.2872338
19	9.6617257	9.9486495	9.7130761	10.2869239
20	9.6619701	9.9485842	9.7133859	10.2866141
21	9.6622145	9.9485189	9.7136956	10.2863044
22	9.6624583	9.9484535	9.7140051	10.2859949
23	9.6627026	9.9483881	9.7143145	10.2856855
24	9.6629464	9.9483227	9.7146237	10.2853763
25	9.6631900	9.9482572	9.7149329	10.2850671
26	9.6634335	9.9481916	9.7152419	10.2847581
27	9.6636768	9.9481260	9.7155506	10.2844492
28	9.6639199	9.9480604	9.7158593	10.2841405
29	9.6641628	9.9479947	9.7161682	10.2838318
30	9.6644056	9.9479289	9.7164767	10.2835233
	Sine Complem.	Sine.	Tangent Complem.	Tang.

62 Degrees

27 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complemen.	
30	9.6644056	9.9479289	9.7164767	10.2835233	30
31	9.6646482	9.9478631	9.7167251	10.2832149	29
32	9.6648906	9.9477973	9.7170933	10.2829067	28
33	9.6651329	9.9477314	9.7174014	10.2825986	27
34	9.6653749	9.9476655	9.7177094	10.2822906	26
35	9.6656168	9.9475995	9.7180173	10.2819827	25
36	9.6658586	9.9475335	9.7183251	10.2816745	24
37	9.6661001	9.9474674	9.7186327	10.2813673	23
38	9.6663415	9.9474013	9.7189402	10.2810598	22
39	9.6665828	9.9473352	9.7192476	10.2807524	21
40	9.6668238	9.9472689	9.7195549	10.2804451	20
41	9.6670647	9.9472027	9.7198620	10.2801380	19
42	9.6673054	9.9471364	9.7201690	10.2798310	18
43	9.6675459	9.9470700	9.7204759	10.2795241	17
44	9.6677863	9.9470036	9.7207827	10.2792173	16
45	9.6680265	9.9469372	9.7210893	10.2789107	15
46	9.6682665	9.9468707	9.7213958	10.2786042	14
47	9.6685064	9.9468042	9.7217022	10.2782978	13
48	9.6687461	9.9467376	9.7220085	10.2779915	12
49	9.6689856	9.9466710	9.7223147	10.2776853	11
50	9.6692250	9.9466043	9.7226207	10.2773793	10
51	9.6694642	9.9465376	9.7229266	10.2770734	9
52	9.6697032	9.9464708	9.7232324	10.2767676	8
53	9.6699420	9.9464040	9.7235381	10.2764619	7
54	9.6701807	9.9463371	9.7238436	10.2761564	6
55	9.6704192	9.9462702	9.7241490	10.2758510	5
56	9.6706576	9.9462032	9.7244543	10.2755457	4
57	9.6708958	9.9461362	9.7247595	10.2752405	3
58	9.6711338	9.9460692	9.7250646	10.2749354	2
59	9.6713716	9.9460021	9.7253695	10.2746305	1
60	9.6716093	9.9459349	9.7256744	10.2743255	0
	Sine Comp'em.	Sine.	Tangent Complem.	Tang.	Minutes.

62 Degrees.

28 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.6716093	9.9459349	9.7256744	10.2743256 60
1	9.6718468	9.9458677	9.7259791	10.2740209 59
2	9.6720841	9.9458005	9.7262837	10.2737163 58
3	9.6723213	9.9457332	9.7265881	10.2734119 57
4	9.6725583	9.9456659	9.7268925	10.2731075 56
5	9.6727952	9.9455985	9.7271967	10.2728033 55
6	9.6730319	9.9455310	9.7275008	10.2724992 54
7	9.6732684	9.9454636	9.7278048	10.2721952 53
8	9.6735047	9.9453960	9.7281087	10.2718913 52
9	9.6737409	9.9453285	9.7284124	10.2715876 51
10	9.6739769	9.9452609	9.7287161	10.2712839 50
11	9.6742128	9.9451932	9.7290196	10.2709804 49
12	9.6744485	9.9451255	9.7293230	10.2706770 48
13	9.6746840	9.9450577	9.7296263	10.2703737 47
14	9.6749194	9.9449899	9.7299295	10.2700705 46
15	9.6751546	9.9449220	9.7302325	10.2697675 45
16	9.6753896	9.9448541	9.7305354	10.2694646 44
17	9.6756245	9.9447862	9.7308383	10.2691617 43
18	9.6758592	9.9447182	9.7311410	10.2688590 42
19	9.6760937	9.9446501	9.7314436	10.2685564 41
20	9.6763281	9.9445821	9.7317460	10.2682540 40
21	9.6765623	9.9445139	9.7320484	10.2679516 39
22	9.6767963	9.9444457	9.7323506	10.2676494 38
23	9.6770302	9.9443775	9.7326527	10.2673473 37
24	9.6772640	9.9443092	9.7329547	10.2670453 36
25	9.6774975	9.9442409	9.7332566	10.2667434 35
26	9.6777309	9.9441725	9.7335584	10.2664416 34
27	9.6779642	9.9441041	9.7338601	10.2661399 33
28	9.6781972	9.9440356	9.7341616	10.2658384 32
29	9.6784301	9.9439671	9.7344631	10.2655369 31
30	9.6786629	9.9438985	9.7347644	10.2652356 30
	Sine Complem.	Sine.	Tangent Complem.	Tang.

61 Degrees

28 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
30	9.6786629	9.9438985	9.7347644	10.2652356	30
31	9.6788955	9.9438299	9.7350656	10.2649344	29
32	9.6791279	9.9437612	9.7353667	10.2646333	28
33	9.6793602	9.9436925	9.7356677	10.2643323	27
34	9.6795923	9.9436238	9.7359685	10.2640315	26
35	9.6798243	9.9435549	9.7362693	10.2637307	25
36	9.6800560	9.9434861	9.7365699	10.2634301	24
37	9.6802877	9.9434172	9.7368705	10.2631295	23
38	9.6805191	9.9433482	9.7371709	10.2628291	22
39	9.6807504	9.9432792	9.7374712	10.2625288	21
40	9.6809816	9.9432102	9.7377714	10.2622286	20
41	9.6812126	9.9431411	9.7380715	10.2619285	19
42	9.6814434	9.9430720	9.7383714	10.2616286	18
43	9.6816741	9.9430028	9.7386713	10.2613287	17
44	9.6819046	9.9429335	9.7389710	10.2610290	16
45	9.6821349	9.9428643	9.7392707	10.2607293	15
46	9.6823651	9.9427949	9.7395702	10.2604298	14
47	9.6825952	9.9427255	9.7398696	10.2601304	13
48	9.6828250	9.9426561	9.7401689	10.2598311	12
49	9.6830548	9.9425866	9.7404681	10.2595319	11
50	9.6832843	9.9425171	9.7407672	10.2592328	10
51	9.6835137	9.9424476	9.7410662	10.2589338	9
52	9.6837430	9.9423779	9.7413650	10.2586350	8
53	9.6839720	9.9423083	9.7416638	10.2583362	7
54	9.6842010	9.9422386	9.7419624	10.2580376	6
55	9.6844297	9.9421688	9.7422609	10.2577391	5
56	9.6846583	9.9420990	9.7425594	10.2574406	4
57	9.6848868	9.9420291	9.7428577	10.2571423	3
58	9.6851151	9.9419592	9.7431559	10.2568441	2
59	9.6853432	9.9418893	9.7434540	10.2565460	1
60	9.6855712	9.9418193	9.7437520	10.2562480	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	

61 Degrees.

29 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.6855712	9.9418193	9.7437520	10.2562480
1	9.6857991	9.9417452	9.7440499	10.2559501
2	9.6860267	9.9416791	9.7443476	10.2556524
3	9.6862542	9.9416090	9.7446453	10.2553547
4	9.6864816	9.9415388	9.7449428	10.2550572
5	9.6867088	9.9414685	9.7452403	10.2547597
6	9.6869359	9.9413982	9.7455376	10.2544624
7	9.6871628	9.9413279	9.7458349	10.2541651
8	9.6873895	9.9412575	9.7461320	10.2538680
9	9.6876161	9.9411871	9.7464290	10.2535710
10	9.6878425	9.9411166	9.7467259	10.2532741
11	9.6880688	9.9410461	9.7470227	10.2529773
12	9.6882949	9.9409755	9.7473194	10.2526806
13	9.6885209	9.9409048	9.7476160	10.2523840
14	9.6887467	9.9408342	9.7479125	10.2520875
15	9.6889723	9.9407634	9.7482089	10.2517911
16	9.6891978	9.9406927	9.7485052	10.2514948
17	9.6894232	9.9406219	9.7488013	10.2511987
18	9.6896484	9.9405510	9.7490974	10.2509026
19	9.6898734	9.9404801	9.7493934	10.2506066
20	9.6900983	9.9404091	9.7496892	10.2503108
21	9.6903231	9.9403381	9.7499850	10.2500150
22	9.6905476	9.9402670	9.7502806	10.2497194
23	9.6907721	9.9401959	9.7505762	10.2494238
24	9.6909964	9.9401248	9.7508716	10.2491284
25	9.6912205	9.9400535	9.7511669	10.2488331
26	9.6914445	9.9399823	9.7514622	10.2485378
27	9.6916683	9.9399110	9.7517573	10.2482427
28	9.6918919	9.9398396	9.7520523	10.2479477
29	9.6921155	9.9397682	9.7523472	10.2476528
30	9.6923388	9.9396968	9.7526420	10.2473580
	Sine Complem.	Sine.	Tangent Complem.	Tang.

60 Degrees.

29 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangenc Complem.	Minutes.
30	9.6923388	9.9396968	9.7526420	10.2473580	30
31	9.6925620	9.9396253	9.75289368	10.2470632	29
32	9.6927851	9.9395537	9.7532314	10.2467686	28
33	9.6930080	9.9394821	9.7535259	10.2464741	27
34	9.6932308	9.9394105	9.7538203	10.2461797	26
35	9.6934534	9.9393388	9.7541146	10.2458854	25
36	9.6936758	9.9392671	9.7544088	10.2455912	24
37	9.6938981	9.9391953	9.7547029	10.2452971	23
38	9.6941203	9.9391234	9.7549969	10.2450031	22
39	9.6943423	9.9390515	9.7552908	10.2447092	21
40	9.6945642	9.9389796	9.7555846	10.2444154	20
41	9.6947859	9.9389076	9.7558783	10.2441217	19
42	9.6950074	9.9388356	9.7561718	10.3438282	18
43	9.6952288	9.9387635	9.7564653	10.2435347	17
44	9.6954501	9.9386914	9.7567587	10.2432413	16
45	9.6956712	9.9386192	9.7570520	10.2429480	15
46	9.6958922	9.9385470	9.7573452	10.2426548	14
47	9.6961130	9.9384747	9.7576383	10.2423617	13
48	9.6963336	9.9384024	9.7579313	10.2420687	12
49	9.6965541	9.9383300	9.7582242	10.2417758	11
50	9.6967745	9.9382576	9.7585170	10.2414830	10
51	9.6969947	9.9381851	9.7588096	10.2411904	9
52	9.6972148	9.9381126	9.7591022	10.2408978	8
53	9.6974347	9.9380400	9.7593947	10.2406053	7
54	9.6976545	9.9379674	9.7596871	10.2403129	6
55	9.6978741	9.9378947	9.7599794	10.2400206	5
56	9.6980936	9.9378220	9.7602716	10.2397284	4
57	9.6983129	9.9377492	9.7605637	10.2394363	3
58	9.6985321	9.9376764	9.7608557	10.2391443	2
59	9.6987511	9.9376035	9.7611476	10.2388524	1
60	9.6989700	9.9375306	9.7614394	10.2385606	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	

60 Degrees.

30 Degrees.

Minutes.

	Sine.	Sine Complem.	Tang.	Tangent Complem.	
0	9.6989700	9.9374306	9.7614394	10.2385606	60
1	9.6991887	9.9374577	9.7617311	10.2382689	59
2	9.6994073	9.9373847	9.7620227	10.2379773	58
3	9.6996258	9.9373116	9.7623142	10.2376858	57
4	9.6998441	9.9372385	9.7626056	10.2373944	56
5	9.7000622	9.9371653	9.7628969	10.2371031	55
6	9.7002802	9.9370921	9.7631881	10.2368119	54
7	9.7004981	9.9370189	9.7634792	10.2365208	53
8	9.7007158	9.9369456	9.7637702	10.2362298	52
9	9.7009334	9.9368722	9.7640612	10.2359388	51
10	9.7011508	9.9367988	9.7643520	10.2356480	50
11	9.7013681	9.9367254	9.7646427	10.2353573	49
12	9.7015852	9.9366519	9.7649334	10.2350666	48
13	9.7018022	9.9365783	9.7652239	10.2347761	47
14	9.7020190	9.9365047	9.7655143	10.2344857	46
15	9.7022357	9.9364311	9.7658047	10.2341953	45
16	9.7024523	9.9363574	9.7660949	10.2339051	44
17	9.7026687	9.9362836	9.7663851	10.2336149	43
18	9.7028849	9.9362098	9.7666751	10.2333249	42
19	9.7031011	9.9361360	9.7669651	10.2330349	41
20	9.7033170	9.9360621	9.7672550	10.2327450	40
21	9.7035329	9.9359881	9.7675448	10.2324552	39
22	9.7037486	9.9359141	9.7678344	10.2321656	38
23	9.7039641	9.9358401	9.7681240	10.2318760	37
24	9.7041795	9.9357660	9.7684135	10.2315865	36
25	9.7043947	9.9356918	9.7687029	10.2312971	35
26	9.7046099	9.9356177	9.7689922	10.2310078	34
27	9.7048248	9.9355434	9.7692814	10.2307186	33
28	9.7050397	9.9354691	9.7695705	10.2304295	32
29	9.7052543	9.9353948	9.7698596	10.2301404	31
30	9.7054689	9.9353204	9.7701485	10.2298515	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

59 Degrees.

30 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	
60	9.7054589	9.9353204	9.7701485	10.2298515	30
59	9.7056833	9.9352459	9.7704373	10.2295627	29
58	9.7058975	9.9351715	9.7707261	10.2292739	28
57	9.7061116	9.9350969	9.7710147	10.2289853	27
56	9.7063256	9.9350223	9.7713033	10.2286967	26
55	9.7065394	9.9349477	9.7715917	10.2284083	25
54	9.7067531	9.9348730	9.7718801	10.2281199	24
53	9.7069667	9.9347983	9.7721684	10.2278316	23
52	9.7071801	9.9347235	9.7724566	10.2275434	22
51	9.7073933	9.9346486	9.7727447	10.2272553	21
50	9.7076064	9.9345738	9.7730327	10.2269673	20
49	9.7078194	9.9344988	9.7733206	10.2266794	19
48	9.7080323	9.9344238	9.7736084	10.2263916	18
47	9.7082450	9.9343488	9.7738961	10.2261039	17
46	9.7084575	9.9342737	9.7741838	10.2258162	16
45	9.7086699	9.9341986	9.7744713	10.2255287	15
44	9.7088822	9.9341234	9.7747588	10.2252412	14
43	9.7090943	9.9340482	9.7750462	10.2249538	13
42	9.7093063	9.9339729	9.7753334	10.2246666	12
41	9.7095182	9.9338976	9.7756206	10.2243794	11
40	9.7097299	9.9338222	9.7759077	10.2240923	10
39	9.7099415	9.9337467	9.7761947	10.2238053	9
38	9.7101529	9.9336713	9.7764816	10.2235184	8
37	9.7103642	9.9335957	9.7767685	10.2232315	7
36	9.7105753	9.9335201	9.7770552	10.2229448	6
35	9.7107863	9.9334445	9.7773418	10.2226582	5
34	9.7109972	9.9333688	9.7776284	10.2223716	4
33	9.7112080	9.9332931	9.7779149	10.2220851	3
32	9.7114186	9.9332173	9.7782012	10.2217988	2
31	9.7116290	9.9331415	9.7784875	10.2215125	1
30	9.7118393	9.9330656	9.7787737	10.2212263	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

59 Degrees.

31 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7118393	9.9330656	9.7787737	10.2212263
1	9.7120495	9.9329897	9.7790599	10.2209401
2	9.7122596	9.9329137	9.7793459	10.2206541
3	9.7124695	9.9328376	9.7796318	10.2203682
4	9.7126792	9.9327616	9.7799177	10.2200823
5	9.7128889	9.9326854	9.7802034	10.2197966
6	9.7130983	9.9326092	9.7804891	10.2195109
7	9.7133077	9.9325330	9.7807747	10.2192253
8	9.7135169	9.9324567	9.7810602	10.2189398
9	9.7137260	9.9323804	9.7813456	10.2186544
10	9.7139349	9.9323040	9.7816309	10.2183691
11	9.7141437	9.9322276	9.7819162	10.2180838
12	9.7143524	9.9321511	9.7822013	10.2177987
13	9.7145609	9.9320746	9.7824864	10.2175136
14	9.7147693	9.9319980	9.7827713	10.2172287
15	9.7149776	9.9319213	9.7830562	10.2169438
16	9.7151857	9.9318447	9.7833410	10.2166590
17	9.7153937	9.9317679	9.7836258	10.2163742
18	9.7156015	9.9316911	9.7839104	10.2160896
19	9.7158092	9.9316143	9.7841949	10.2158051
20	9.7160168	9.9315374	9.7844794	10.2155206
21	9.7162243	9.9314605	9.7847638	10.2152362
22	9.7164316	9.9313835	9.7850481	10.2149519
23	9.7166387	9.9313065	9.7853323	10.2146677
24	9.7168458	9.9312294	9.7856164	10.2143836
25	9.7170526	9.9311522	9.7859004	10.2140996
26	9.7172594	9.9310750	9.7861844	10.2138156
27	9.7174660	9.9309978	9.7864682	10.2135318
28	9.7176725	9.9309205	9.7867520	10.2132480
29	9.7178789	9.9308432	9.7870357	10.2129643
30	9.7180851	9.9307658	9.7873193	10.2126807
	Sine Complem.	Sine.	Tangent Complem.	Tang.

58 Degrees.

31 Degrees.

	Sine.	Sine Complement.	Tang.	Tangent Complement.	
30	9.7180851	9.9307658	9.7873193	10.2126807	30
31	9.7182912	9.9306883	9.7876028	10.2123972	29
32	9.7184971	9.9306109	9.7878863	10.2121137	28
33	9.7187030	9.9305333	9.7881696	10.2118304	27
34	9.7189086	9.9304557	9.7884529	10.2115471	26
35	9.7191142	9.9303781	9.7887361	10.2112639	25
36	9.7193196	9.9303004	9.7890192	10.2109808	24
37	9.7195249	9.9302226	9.7893023	10.2106977	23
38	9.7197300	9.9301448	9.7895852	10.2104148	22
39	9.7199350	9.9300670	9.7898681	10.2101319	21
40	9.7201399	9.9299891	9.7901508	10.2098492	20
41	9.7203447	9.9299112	9.7904335	10.2095665	19
42	9.7205493	9.9298332	9.7907161	10.2092839	18
43	9.7207538	9.9297551	9.7909987	10.2090013	17
44	9.7209581	9.9296770	9.7912811	10.2087189	16
45	9.7211623	9.9295989	9.7915635	10.2084365	15
46	9.7213664	9.9295207	9.7918458	10.2081542	14
47	9.7215704	9.9294424	9.7921280	10.2078720	13
48	9.7217742	9.9293641	9.7924101	10.2075899	12
49	9.7219779	9.9292857	9.7926921	10.2073079	11
50	9.7221814	9.9292073	9.7929741	10.2070259	10
51	9.7223848	9.9291289	9.7932560	10.2067440	9
52	9.7225881	9.9290504	9.7935378	10.2064622	8
53	9.7227913	9.9289718	9.7938195	10.2061805	7
54	9.7229943	9.9288932	9.7941011	10.2058989	6
55	9.7231972	9.9288145	9.7943827	10.2056173	5
56	9.7234000	9.9287358	9.7946641	10.2053359	4
57	9.7236026	9.9286571	9.7949455	10.2050545	3
58	9.7238051	9.9285783	9.7952268	10.2047732	2
59	9.7240075	9.9284994	9.7955081	10.2044919	1
60	9.7242097	9.9284205	9.7957892	10.2042108	0
	Sine Complement.	Sine.	Tangent Complement.	Tang.	Minutes.

58 Degrees.

Minutes.

32 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
0 9.7242097	9.9284205	9.7957892	10.20421086
1 9.7244118	9.9283415	9.7960703	10.20392979
2 9.7246138	9.9282625	9.7963513	10.20364879
3 9.7248156	9.9281834	9.7966322	10.20336785
4 9.7250174	9.9281043	9.7969130	10.20308703
5 9.7252189	9.9280251	9.7971938	10.20280623
6 9.7254204	9.9279459	9.7974745	10.20252554
7 9.7256217	9.9278666	9.7977551	10.20224495
8 9.7258229	9.9277873	9.7980356	10.20196445
9 9.7260240	9.9277079	9.7983160	10.20168405
10 9.7262249	9.9276285	9.7985964	10.20140369
11 9.7264257	9.9275490	9.7988767	10.20112334
12 9.7266264	9.9274695	9.7991569	10.20084314
13 9.7268269	9.9273899	9.7994370	10.20056307
14 9.7270273	9.9273103	9.7997170	10.20028304
15 9.7272276	9.9272306	9.7999970	10.20000304
16 9.7274278	9.9271509	9.8002769	10.19972314
17 9.7276278	9.9270711	9.8005567	10.19944334
18 9.7278277	9.9269913	9.8008365	10.19916354
19 9.7280275	9.9269114	9.8011161	10.19888394
20 9.7282271	9.9268314	9.8013957	10.19860434
21 9.7284267	9.9267514	9.8016752	10.19832483
22 9.7286260	9.9266714	9.8019546	10.19804543
23 9.7288253	9.9265913	9.8022340	10.19776603
24 9.7290244	9.9265112	9.8025133	10.19748673
25 9.7292234	9.9264310	9.8027925	10.19720753
26 9.7294223	9.9263507	9.8030716	10.19692843
27 9.7296211	9.9262704	9.8033506	10.19664943
28 9.7298197	9.9261901	9.8036290	10.19637043
29 9.7300182	9.9261096	9.8039085	10.19609153
30 9.7302165	9.9260292	9.8041873	10.19581273
Sine Complem.	Sine.	Tangent Complem.	Tang.

57 Degrees.

Minutes.

32 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.	
9.7302165	9.9260292	9.8041873	10.1958127	30
9.7304148	9.9259487	9.8044661	10.1955339	29
9.7306129	9.9258681	9.8047447	10.1952553	28
9.7308109	9.9257875	9.8050233	10.1949767	27
9.7310087	9.9257069	9.8053019	10.1946981	26
9.7312064	9.9256261	9.8055803	10.1944197	25
9.7314040	9.9255454	9.8058587	10.1941413	24
9.7316015	9.9254646	9.8061370	10.1938630	23
9.7317989	9.9253837	9.8064152	10.1935848	22
9.7319961	9.9253028	9.8066933	10.1933067	21
9.7321932	9.9252218	9.8069714	10.1930286	20
9.7323902	9.9251408	9.8072494	10.1927506	19
9.7325870	9.9250597	9.8075273	10.1924727	18
9.7327837	9.9249786	9.8078052	10.1921948	17
9.7329803	9.9248974	9.8080829	10.1919171	16
9.7331768	9.9248161	9.8083606	10.1916394	15
9.7333731	9.9247349	9.8086383	10.1913617	14
9.7335693	9.9246535	9.8089158	10.1910842	13
9.7337654	9.9245721	9.8091933	10.1908067	12
9.7339614	9.9244907	9.8094707	10.1905293	11
9.7341572	9.9244092	9.8097480	10.1902520	10
9.7343529	9.9243277	9.8100253	10.1899747	9
9.7345485	9.9242461	9.8103025	10.1896975	8
9.7347440	9.9241644	9.8105796	10.1894204	7
9.7349393	9.9240827	9.8108566	10.1891434	6
9.7351345	9.9240010	9.8111336	10.1888664	5
9.7353296	9.9239191	9.8114105	10.1885895	4
9.7355246	9.9238373	9.8116873	10.1883127	3
9.7357195	9.9237554	9.8119641	10.1880359	2
9.7359142	9.9236734	9.8122408	10.1877592	1
9.7361088	9.9235914	9.8125174	10.1874826	0
Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

57 Degrees.

33 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7361088	9.9235914	9.8125174	10.1874826
1	9.7363032	9.9235093	9.8127939	10.1872061
2	9.7364976	9.9234272	9.8130704	10.1869296
3	9.7366918	9.9233450	9.8133468	10.1866532
4	9.7368859	9.9232628	9.8136231	10.1863769
5	9.7370799	9.9231805	9.8138993	10.1861007
6	9.7372737	9.9230982	9.8141755	10.1858245
7	9.7374675	9.9230158	9.8144516	10.1855484
8	9.7376611	9.9229334	9.8147277	10.1852722
9	9.7378546	9.9228509	9.8150036	10.1849964
10	9.7380479	9.9227684	9.8152795	10.1847205
11	9.7382412	9.9226858	9.8155554	10.1844446
12	9.7384343	9.9226032	9.8158311	10.1841689
13	9.7386273	9.9225205	9.8161068	10.1838932
14	9.7388201	9.9224377	9.8163824	10.1836176
15	9.7390129	9.9223549	9.8166580	10.1833420
16	9.7392055	9.9222721	9.8169335	10.1830664
17	9.7393980	9.9221891	9.8172089	10.1827911
18	9.7395904	9.9221062	9.8174842	10.1825158
19	9.7397827	9.9220232	9.8177595	10.1822405
20	9.7399748	9.9219401	9.8180347	10.1819653
21	9.7401668	9.9218570	9.8183098	10.1816902
22	9.7403587	9.9217738	9.8185849	10.1814151
23	9.7405505	9.9216906	9.8188599	10.1811404
24	9.7407421	9.9216073	9.8191348	10.1808652
25	9.7409337	9.9215240	9.8194096	10.1805904
26	9.7411251	9.9214406	9.8196844	10.1803156
27	9.7413164	9.9213572	9.8199592	10.1800408
28	9.7415075	9.9212737	9.8202338	10.1797662
29	9.7416986	9.9211903	9.8205084	10.1794915
30	9.7418895	9.9211066	9.8207829	10.1792171
	Sine Complem.	Sine.	Tangent Complem.	Tang.

56 Degrees.

33 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
9.7418895	9.9211066	9.8207829	10.1792171
9.7420803	9.9210229	9.8210574	10.1789426
9.7422710	9.9209393	9.8213317	10.1786683
9.7424616	9.9208555	9.8216060	10.1783940
9.7426520	9.9207717	9.8218803	10.1781197
9.7428423	9.9206878	9.8221545	10.1778455
9.7430325	9.9206039	9.8224286	10.1775714
9.7432226	9.9205200	9.8227026	10.1772974
9.7434126	9.9204360	9.8229766	10.1770234
9.7436024	9.9203519	9.8232505	10.1767495
9.7437921	9.9202678	9.8235244	10.1764756
9.7439817	9.9201836	9.8237981	10.1762019
9.7441712	9.9200994	9.8240719	10.1759281
9.7443606	9.9200151	9.8243455	10.1756545
9.7445498	9.9199308	9.8246191	10.1753809
9.7447390	9.9198464	9.8248926	10.1751074
9.7449280	9.9197619	9.8251660	10.1748340
9.7451169	9.9196775	9.8254394	10.1745606
9.7453056	9.9195929	9.8257127	10.1742873
9.7454943	9.9195083	9.8259860	10.1740140
9.7456828	9.9194237	9.8262592	10.1737408
9.7458712	9.9193390	9.8265323	10.1734677
9.7460595	9.9192542	9.8268053	10.1731947
9.7462477	9.9191694	9.8270783	10.1729217
9.7464358	9.9190845	9.8273513	10.1726487
9.7466237	9.9189996	9.8276244	10.1723759
9.7468115	9.9189146	9.8278969	10.1721031
9.7469992	9.9188296	9.8281696	10.1718304
9.7471868	9.9187445	9.8284423	10.1715577
9.7473743	9.9186594	9.8287149	10.1712851
9.7475617	9.9185742	9.8289874	10.1710126
Sine Complem.	Sine.	Tangent Complem.	Tang.

56 Degrees.

Minutes.

34 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7475617	9.9185742	9.8289874	10.1710126
1	9.7477489	9.9184890	9.8292599	10.1707401
2	9.7479360	9.9184037	9.8295323	10.1704677
3	9.7481230	9.9183183	9.8298047	10.1701953
4	9.7483099	9.9182329	9.8300769	10.1699231
5	9.7484967	9.9181475	9.8303492	10.1696508
6	9.7486833	9.9180620	9.8306213	10.1693787
7	9.7488698	9.9179764	9.8308934	10.1691066
8	9.7490562	9.9178908	9.8311654	10.1688346
9	9.7492425	9.9178051	9.8314374	10.1685626
10	9.7494287	9.9177194	9.8317093	10.1682907
11	9.7496148	9.9176336	9.8319811	10.1680189
12	9.7498007	9.9175478	9.8322529	10.1677471
13	9.7499866	9.9174619	9.8325246	10.1674754
14	9.7501723	9.9173760	9.8327963	10.1672037
15	9.7503579	9.9172900	9.8330679	10.1669321
16	9.7505434	9.9172040	9.8333394	10.1666606
17	9.7507287	9.9171179	9.8336109	10.1663891
18	9.7509140	9.9170317	9.8338823	10.1661177
19	9.7510991	9.9169455	9.8341536	10.1658464
20	9.7512842	9.9168593	9.8344249	10.1655751
21	9.7514691	9.9167730	9.8346961	10.1653039
22	9.7516538	9.9166866	9.8349673	10.1650327
23	9.7518385	9.9166002	9.8352384	10.1647616
24	9.7520231	9.9165137	9.8355094	10.1644906
25	9.7522075	9.9164272	9.8357804	10.1642196
26	9.7523919	9.9163406	9.8360513	10.1639487
27	9.7525761	9.9162539	9.8363221	10.1636779
28	9.7527602	9.9161673	9.8365929	10.1634071
29	9.7529442	9.9160805	9.8368636	10.1631364
30	9.7531280	9.9159937	9.8371343	10.1628657
	Sine Complem.	Sine.	Tangent Complem.	Tang.

55 Degrees.

34 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.	
9.7531280	9.9159937	9.8371343	10.1628657	30
9.7533118	9.9159069	9.8374049	10.1625951	29
9.7534954	9.9158200	9.8376755	10.1623245	28
9.7536790	9.9157330	9.8379460	10.1620540	27
9.7538624	9.9156460	9.8382164	10.1617836	26
9.7540457	9.9155589	9.8384867	10.1615133	25
9.7542288	9.9154718	9.8387571	10.1612429	24
9.7544119	9.9153846	9.8390273	10.1609727	23
9.7545949	9.9152974	9.8392975	10.1607025	22
9.7547777	9.9152101	9.8395676	10.1604324	21
9.7549604	9.9151228	9.8398377	10.1601623	20
9.7551431	9.9150354	9.8401077	10.1598923	19
9.7553256	9.9149479	9.8403776	10.1596224	18
9.7555080	9.9148604	9.8406475	10.1593525	17
9.7556902	9.9147729	9.8409174	10.1590826	16
9.7558724	9.9146852	9.8411871	10.1588129	15
9.7560544	9.9145976	9.8414569	10.1585431	14
9.7562364	9.9145099	9.8417265	10.1582735	13
9.7564182	9.9144221	9.8419961	10.1580039	12
9.7565999	9.9143342	9.8422657	10.1577343	11
9.7567815	9.9142464	9.8425351	10.1574649	10
9.7569630	9.9141584	9.8428046	10.1571954	9
9.7571444	9.9140704	9.8430739	10.1569261	8
9.7573256	9.9139824	9.8433432	10.1566568	7
9.7575068	9.9138943	9.8436125	10.1563875	6
9.7576878	9.9138051	9.8438817	10.1561183	5
9.7578687	9.9137179	9.8441508	10.1558492	4
9.7580495	9.9136296	9.8444199	10.1555801	3
9.7582302	9.9135413	9.8446889	10.1553111	2
9.7584108	9.9134530	9.8449579	10.1550421	1
9.7585913	9.9133645	9.8452268	10.1547732	0
Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

55 Degrees.

N

35 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.7585913	9.9133645	9.8452268	10.1547732	60
1	9.7587717	9.9132760	9.8454956	10.1545044	59
2	9.7589519	9.9131875	9.8457644	10.1542356	58
3	9.7591321	9.9130989	9.8460332	10.1539668	57
4	9.7593121	9.9130102	9.8463018	10.1536982	56
5	9.7594920	9.9129215	9.8465705	10.1534295	55
6	9.7596718	9.9128328	9.8468390	10.1531610	54
7	9.7598515	9.9127440	9.8471075	10.1528925	53
8	9.7600311	9.9126551	9.8473760	10.1526240	52
9	9.7602106	9.9125662	9.8476444	10.1523556	51
10	9.7603899	9.9124772	9.8479127	10.1520873	50
11	9.7605692	9.9123882	9.8481810	10.1518190	49
12	9.7607483	9.9122991	9.8484492	10.1515508	48
13	9.7609274	9.9122099	9.8487174	10.1512826	47
14	9.7611063	9.9121207	9.8489855	10.1510145	46
15	9.7612851	9.9120315	9.8492536	10.1507464	45
16	9.7614638	9.9119422	9.8495216	10.1504784	44
17	9.7616424	9.9118528	9.8497896	10.1502104	43
18	9.7618208	9.9117634	9.8500575	10.1499425	42
19	9.7619992	9.9116739	9.8503253	10.1496747	41
20	9.7621775	9.9115844	9.8505931	10.1494069	40
21	9.7623556	9.9114948	9.8508608	10.1491392	39
22	9.7625337	9.9114051	9.8511285	10.1488715	38
23	9.7627116	9.9113153	9.8513961	10.1486039	37
24	9.7628894	9.9112257	9.8516637	10.1483363	36
25	9.7630671	9.9111359	9.8519312	10.1480688	35
26	9.7632447	9.9110460	9.8521987	10.1478013	34
27	9.7634222	9.9109561	9.8524661	10.1475339	33
28	9.7635996	9.9108661	9.8527335	10.1472665	32
29	9.7637769	9.9107761	9.8530008	10.1469992	31
30	9.7639540	9.9106860	9.8532680	10.1467320	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	Minutes.

54 Degrees.

35 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	
0	9.7630540	9.9106860	9.8322680	10.1467320	30
1	9.7641811	9.9105939	9.8335352	10.1464648	29
2	9.7643080	9.9105057	9.8338023	10.1461977	28
3	9.7644849	9.9104155	9.8340694	10.1459306	27
4	9.7646616	9.9103251	9.8343365	10.1456635	26
5	9.7648382	9.9102348	9.8346034	10.1453966	25
6	9.7650147	9.9101444	9.8348704	10.1451295	24
7	9.7651911	9.9100539	9.8351372	10.1448624	23
8	9.7653674	9.9099634	9.8354041	10.1445953	22
9	9.7655436	9.9098728	9.8356708	10.1443282	21
10	9.7657197	9.9097821	9.8359376	10.1440611	20
11	9.7658957	9.9096915	9.8362042	10.1437940	19
12	9.7660715	9.9096007	9.8364708	10.1435269	18
13	9.7662473	9.9095099	9.8367374	10.1432598	17
14	9.7664229	9.9094190	9.8370039	10.1429927	16
15	9.7665985	9.9093281	9.8372704	10.1427256	15
16	9.7667739	9.9092371	9.8375368	10.1424585	14
17	9.7669492	9.9091461	9.8378031	10.1421914	13
18	9.7671244	9.9090550	9.8380694	10.1419243	12
19	9.7672996	9.9089639	9.8383357	10.1416572	11
20	9.7674746	9.9088727	9.8386019	10.1413901	10
21	9.7676494	9.9087814	9.8388680	10.1411230	9
22	9.7678242	9.9086901	9.8391341	10.1408559	8
23	9.7679989	9.9085988	9.8394002	10.1405888	7
24	9.7681735	9.9085073	9.8396661	10.1403217	6
25	9.7683480	9.9084159	9.8399321	10.1400546	5
26	9.7685223	9.9083243	9.8601980	10.1397875	4
27	9.7686966	9.9082327	9.8604638	10.1395204	3
28	9.7688707	9.9081411	9.8607296	10.1392533	2
29	9.7690448	9.9080494	9.8609954	10.1389862	1
30	9.7692187	9.9079576	9.8612610	10.1387191	0

Sine Complem.	Sine.	Tangent Complem.	Tang.
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54 Degrees.

N 2'

36 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7692187	9.9079576	9.8612610	10.138739060
1	9.7693925	9.9078658	9.8615267	10.138473339
2	9.7695662	9.9077740	9.8617923	10.138207758
3	9.7697398	9.9076820	9.8620578	10.137942257
4	9.7699134	9.9075901	9.8623233	10.137676756
5	9.7700868	9.9074980	9.8625887	10.137411355
6	9.7702601	9.9074059	9.8628541	10.137145954
7	9.7704332	9.9073138	9.8631195	10.136880553
8	9.7706063	9.9072216	9.8633848	10.136615252
9	9.7707793	9.9071293	9.8636500	10.136350051
10	9.7709522	9.9070370	9.8639152	10.136084850
11	9.7711249	9.9069446	9.8641803	10.135819749
12	9.7712976	9.9068522	9.8644454	10.135554548
13	9.7714702	9.9067597	9.8647105	10.135289347
14	9.7716426	9.9066671	9.8649755	10.135024146
15	9.7718152	9.9065745	9.8652404	10.134758945
16	9.7719872	9.9064819	9.8655053	10.134493744
17	9.7721593	9.9063892	9.8657702	10.134228543
18	9.7723314	9.9062964	9.8660350	10.133963342
19	9.7725033	9.9062036	9.8662997	10.133700041
20	9.7726751	9.9061107	9.8665644	10.133434840
21	9.7728468	9.9060177	9.8668291	10.133170939
22	9.7730185	9.9059247	9.8670937	10.132906938
23	9.7731900	9.9058317	9.8673583	10.132642737
24	9.7733614	9.9057386	9.8676228	10.132377536
25	9.7735327	9.9056454	9.8678873	10.132112335
26	9.7737035	9.9055522	9.8681517	10.131848334
27	9.7738749	9.9054589	9.8684160	10.131584033
28	9.7740455	9.9053656	9.8686804	10.131319632
29	9.7742168	9.9052722	9.8689446	10.131055431
30	9.7743876	9.9051787	9.8692089	10.130791130
	Sine Complem.	Sine.	Tangent Complem.	Tang.

52 Degrees.

Minutes.

36 Degrees.

Sine.	Sine Complement.	Tang.	Tangent Complement	
0 9.7743876	9.9051787	9.8692089	10.1307911	30
1 9.7745583	9.9050852	9.8694731	10.1305269	29
2 9.7747288	9.9049916	9.8697372	10.1302628	28
3 9.7748993	9.9048980	9.8700013	10.1299987	27
4 9.7750697	9.9048043	9.8702653	10.1297347	26
5 9.7752399	9.9047106	9.8705293	10.1294707	25
6 9.7754101	9.9046168	9.8707933	10.1292067	24
7 9.7755801	9.9045230	9.8710572	10.1289428	23
8 9.7757501	9.9044291	9.8713210	10.1286790	22
9 9.7759199	9.9043351	9.8715848	10.1284152	21
0 9.7760897	9.9042411	9.8718486	10.1281514	20
1 9.7762593	9.9041470	9.8721123	10.1278877	19
2 9.7764289	9.9040529	9.8723760	10.1276240	18
3 9.7765983	9.9039587	9.8726396	10.1273604	17
4 9.7767676	9.9038644	9.8729032	10.1270968	16
5 9.7769369	9.9037701	9.8731668	10.1268332	15
6 9.7771060	9.9036757	9.8734302	10.1265698	14
7 9.7772750	9.9035813	9.8736937	10.1263063	13
8 9.7774439	9.9034868	9.8739571	10.1260429	12
9 9.7776128	9.9033923	9.8742204	10.1257796	11
0 9.7777815	9.9032977	9.8744838	10.1255162	10
1 9.7779501	9.9032031	9.8747470	10.1252530	9
2 9.7781186	9.9031084	9.8750102	10.1249898	8
3 9.7782870	9.9030136	9.8752734	10.1247266	7
4 9.7784553	9.9029188	9.8755365	10.1244635	6
5 9.7786235	9.9028239	9.8757996	10.1242004	5
6 9.7787916	9.9027289	9.8760627	10.1239373	4
7 9.7789596	9.9026339	9.8763257	10.1236743	3
8 9.7791275	9.9025389	9.8765886	10.1234114	2
9 9.7792953	9.9024438	9.8768515	10.1231485	1
0 9.7794630	9.9023486	9.8771144	10.1228856	0
Sine Comp'm.	Sine.	Tangent Complement	Tang.	Minutes.

53 Degrees.

37 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7794630	9.9023486	9.8771144	10.1228856
1	9.7796356	9.9022134	9.8773772	10.1226228
2	9.7797981	9.9021138	9.8776400	10.1223600
3	9.7799655	9.9020628	9.8779027	10.1220973
4	9.7801328	9.9019674	9.8781654	10.1218346
5	9.7803000	9.9018719	9.8784281	10.1215719
6	9.7804671	9.9017764	9.8786907	10.1213093
7	9.7806341	9.9016808	9.8789533	10.1210467
8	9.7808010	9.9015852	9.8792158	10.1207841
9	9.7809677	9.9014895	9.8794782	10.1205215
10	9.7811344	9.9013938	9.8797407	10.1202590
11	9.7813010	9.9012980	9.8800031	10.1199964
12	9.7814675	9.9012021	9.8802654	10.1197338
13	9.7816339	9.9011062	9.8805277	10.1194713
14	9.7818002	9.9010102	9.8807900	10.1192087
15	9.7819664	9.9009142	9.8810522	10.1189461
16	9.7821324	9.9008181	9.8813144	10.1186835
17	9.7822984	9.9007219	9.8815765	10.1184209
18	9.7824643	9.9006257	9.8818386	10.1181583
19	9.7826301	9.9005294	9.8821007	10.1178957
20	9.7827958	9.9004331	9.8823627	10.1176331
21	9.7829614	9.9003367	9.8826246	10.1173705
22	9.7831268	9.9002403	9.8828866	10.1171079
23	9.7832922	9.9001438	9.8831484	10.1168453
24	9.7834575	9.9000472	9.8834103	10.1165827
25	9.7836227	9.8999506	9.8836721	10.1163201
26	9.7837878	9.8998539	9.8839338	10.1160575
27	9.7839528	9.8997572	9.8841956	10.1157949
28	9.7841177	9.8996604	9.8844572	10.1155323
29	9.7842824	9.8995636	9.8847189	10.1152697
30	9.7844471	9.8994667	9.8849805	10.1150071
	Sine Complem.	Sine.	Tangent Complem.	Tang.

52 Degrees.

37 Degrees.

Minutes	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes
0	9.7844471	9.8994667	9.8849805	10.1150195	30
1	9.7846117	9.8993697	9.8851420	10.1147580	29
2	9.7847762	9.8992726	9.8853035	10.1144965	28
3	9.7849406	9.8991757	9.8854650	10.1142350	27
4	9.7851049	9.8990784	9.8856264	10.1139736	26
5	9.7852691	9.8989812	9.8857878	10.1137122	25
6	9.7854332	9.8988840	9.8859492	10.1134508	24
7	9.7855972	9.8987867	9.8861105	10.1131893	23
8	9.7857611	9.8986893	9.8862718	10.1129282	22
9	9.7859249	9.8985919	9.8864330	10.1126670	21
10	9.7860886	9.8984944	9.8865942	10.1124058	20
11	9.7862522	9.8983968	9.8867554	10.1121446	19
12	9.7864157	9.8982992	9.8869165	10.1118833	18
13	9.7865791	9.8982015	9.8870775	10.1116225	17
14	9.7867424	9.8981038	9.8872386	10.1113614	16
15	9.7869056	9.8980060	9.8873996	10.1111004	15
16	9.7870687	9.8979082	9.8875605	10.1108393	14
17	9.7872317	9.8978103	9.8877214	10.1105786	13
18	9.7873946	9.8977123	9.8878823	10.1103177	12
19	9.7875574	9.8976143	9.8880432	10.1100568	11
20	9.7877202	9.8975162	9.8882040	10.1097960	10
21	9.7878828	9.8974181	9.8883647	10.1095353	9
22	9.7880453	9.8973199	9.8885254	10.1092746	8
23	9.7882077	9.8972216	9.8886861	10.1090139	7
24	9.7883701	9.8971233	9.8888468	10.1087532	6
25	9.7885323	9.8970249	9.8890074	10.1084926	5
26	9.7886944	9.8969265	9.8891679	10.1082321	4
27	9.7888565	9.8968280	9.8893283	10.1079715	3
28	9.7890184	9.8967294	9.8894890	10.1077110	2
29	9.7891802	9.8966308	9.8896494	10.1074506	1
30	9.7893420	9.8965321	9.8898098	10.1071902	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

52 Degrees.

38 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.7893420	9.8965321	9.8928098	10.1071902	60
1	9.78935036	9.8964334	9.8930703	10.1069298	59
2	9.78936652	9.8963346	9.8933306	10.1066694	58
3	9.78938266	9.8962358	9.8935909	10.1064091	57
4	9.78939889	9.8961369	9.8938511	10.1061489	56
5	9.7901493	9.8960379	9.8941114	10.1058886	55
6	9.7903104	9.8959389	9.8943715	10.1056285	54
7	9.7904715	9.8958398	9.8946317	10.1053683	53
8	9.7906325	9.8957406	9.8948918	10.1051082	52
9	9.7907933	9.8956414	9.8951519	10.1048481	51
10	9.7909541	9.8955422	9.8954119	10.1045881	50
11	9.7911148	9.8954429	9.8956719	10.1043281	49
12	9.7912754	9.8953435	9.8959319	10.1040681	48
13	9.7914359	9.8952440	9.8961918	10.1038082	47
14	9.7915963	9.8951445	9.8964517	10.1035483	46
15	9.7917566	9.8950450	9.8967116	10.1032884	45
16	9.7919168	9.8949453	9.8969714	10.1030286	44
17	9.7920769	9.8948457	9.8972312	10.1027688	43
18	9.7922369	9.8947459	9.8974910	10.1025090	42
19	9.7923968	9.8946461	9.8977507	10.1022493	41
20	9.7925566	9.8945463	9.8980104	10.1019896	40
21	9.7927163	9.8944465	9.8982700	10.1017300	39
22	9.7928760	9.8943464	9.8985296	10.1014704	38
23	9.7930355	9.8942463	9.8987892	10.1012108	37
24	9.7931949	9.8941462	9.8990487	10.1009513	36
25	9.7933543	9.8940461	9.8993082	10.1006918	35
26	9.7935135	9.8939458	9.8995677	10.1004323	34
27	9.7936727	9.8938455	9.8998271	10.1001729	33
28	9.7938317	9.8937452	9.9000865	10.0999139	32
29	9.7939907	9.8936448	9.9003459	10.0996541	31
30	9.7941496	9.8935444	9.9006052	10.0993948	30
	Sine Complem.	Sine	Tangent Complem.	Tang.	

51 Degrees.

30 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tang. cnc Complement.	
30	9.7941496	9.8935444	9.9006052	10.0993948	30
31	9.7943083	9.8934439	9.9008645	10.0991355	29
32	9.7944670	9.8933433	9.9011237	10.0988763	28
33	9.7946256	9.8932426	9.9013830	10.0986170	27
34	9.7947841	9.8931419	9.9016422	10.0983578	26
35	9.7949425	9.8930412	9.9019013	10.0980987	25
36	9.7951008	9.8929404	9.9021604	10.0978396	24
37	9.7952590	9.8928395	9.9024195	10.0975805	23
38	9.7954171	9.8927385	9.9026786	10.0973214	22
39	9.7955751	9.8926375	9.9029376	10.0970624	21
40	9.7957330	9.8925365	9.9031966	10.0968034	20
41	9.7958909	9.8924354	9.9034555	10.0965443	19
42	9.7960486	9.8923342	9.9037144	10.0962852	18
43	9.7962062	9.8922329	9.9039733	10.0960261	17
44	9.7963638	9.8921316	9.9042321	10.0957670	16
45	9.7965212	9.8920303	9.9044910	10.0955079	15
46	9.7966786	9.8919289	9.9047497	10.0952488	14
47	9.7968359	9.8918274	9.9050085	10.0949897	13
48	9.7969930	9.8917258	9.9052672	10.0947306	12
49	9.7971501	9.8916242	9.9055259	10.0944715	11
50	9.7973071	9.8915226	9.9057845	10.0942124	10
51	9.7974640	9.8914208	9.9060431	10.0939533	9
52	9.7976208	9.8913191	9.9063017	10.0936942	8
53	9.7977775	9.8912172	9.9065603	10.0934351	7
54	9.7979341	9.8911153	9.9068188	10.0931760	6
55	9.7980906	9.8910133	9.9070773	10.0929169	5
56	9.7982470	9.8909113	9.9073357	10.0926578	4
57	9.7984034	9.8908092	9.9075941	10.0923987	3
58	9.7985596	9.8907071	9.9078525	10.0921396	2
59	9.7987158	9.8906049	9.9081109	10.0918805	1
60	9.7988718	9.8905026	9.9083692	10.0916214	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	Minutes.

51 Degrees.

39 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.7988718	9.8905026	9.9083692	10.0916308
1	9.7990278	9.8904003	9.9086275	10.0913725
2	9.7991836	9.8902979	9.9088858	10.0911142
3	9.7993394	9.8901954	9.9091440	10.0908560
4	9.7994951	9.8900929	9.9094022	10.0905978
5	9.7996507	9.8899903	9.9096603	10.0903397
6	9.7998062	9.8898877	9.9099185	10.0900815
7	9.7999616	9.8897850	9.9101766	10.0898234
8	9.8001169	9.8896822	9.9104347	10.0895653
9	9.8002721	9.8895794	9.9106927	10.0893073
10	9.8004272	9.8894765	9.9109507	10.0890493
11	9.8005823	9.8893736	9.9112087	10.0887913
12	9.8007372	9.8892706	9.9114666	10.0885334
13	9.8008921	9.8891675	9.9117245	10.0882755
14	9.8010468	9.8890644	9.9119824	10.0880176
15	9.8012015	9.8889612	9.9122403	10.0877597
16	9.8013561	9.8888580	9.9124981	10.0875019
17	9.8015106	9.8887547	9.9127559	10.0872441
18	9.8016649	9.8886513	9.9130137	10.0869863
19	9.8018192	9.8885479	9.9132714	10.0867286
20	9.8019735	9.8884444	9.9135291	10.0864709
21	9.8021276	9.8883408	9.9137868	10.0862132
22	9.8022816	9.8882372	9.9140444	10.0859556
23	9.8024355	9.8881335	9.9143020	10.0856980
24	9.8025894	9.8880298	9.9145596	10.0854404
25	9.8027431	9.8879260	9.9148171	10.0851829
26	9.8028968	9.8878221	9.9150747	10.0849253
27	9.8030504	9.8877182	9.9153322	10.0846678
28	9.8032038	9.8876142	9.9155896	10.0844104
29	9.8033572	9.8875102	9.9158471	10.0841529
30	9.8035105	9.8874061	9.9161045	10.0838955
	Sine Complem.	Sine.	Tangent Complem.	Tang.

50 Degrees.

39 Degrees.

	Sine.	Sine Complem.	Tang.	Tangent Complem.	
30	9.8035105	9.8874061	9.9161045	10.0838955	30
31	9.8036637	9.8873019	9.9163618	10.0836382	29
32	9.8038168	9.8871977	9.9166192	10.0833808	28
33	9.8039699	9.8870934	9.9168765	10.0831235	27
34	9.8041228	9.8869890	9.9171338	10.0828662	26
35	9.8042757	9.8868846	9.9173911	10.0826089	25
36	9.8044284	9.8867801	9.9176483	10.0823517	24
37	9.8045811	9.8866756	9.9179055	10.0820945	23
38	9.8047336	9.8865710	9.9181627	10.0818373	22
39	9.8048861	9.8864663	9.9184198	10.0815802	21
40	9.8050385	9.8863616	9.9186769	10.0813231	20
41	9.8051908	9.8862568	9.9189340	10.0810660	19
42	9.8053430	9.8861519	9.9191911	10.0808089	18
43	9.8054951	9.8860470	9.9194481	10.0805519	17
44	9.8056472	9.8859420	9.9197051	10.0802949	16
45	9.8057991	9.8858370	9.9199621	10.0800379	15
46	9.8059510	9.8857319	9.9202191	10.0797809	14
47	9.8061027	9.8856267	9.9204760	10.0795240	13
48	9.8062544	9.8855215	9.9207329	10.0792671	12
49	9.8064060	9.8854162	9.9209898	10.0790102	11
50	9.8065575	9.8853109	9.9212466	10.0787534	10
51	9.8067089	9.8852055	9.9215034	10.0784966	9
52	9.8068602	9.8851000	9.9217602	10.0782398	8
53	9.8070114	9.8849945	9.9220170	10.0779830	7
54	9.8071626	9.8848889	9.9222737	10.0777263	6
55	9.8073136	9.8847832	9.9225304	10.0774696	5
56	9.8074646	9.8846775	9.9227871	10.0772129	4
57	9.8076154	9.8845717	9.9230437	10.0769563	3
58	9.8077662	9.8844659	9.9233004	10.0766996	2
59	9.8079169	9.8843599	9.9235570	10.0764430	1
60	9.8080675	9.8842540	9.9238135	10.0761863	0
	Sine Complem.	Sine.	Tang. Complem.	Tang.	Minutes.

50 Degrees.

40 Degrees.				
Minutes.	Sine.	Sine Complement.	Tang.	Tangent Complement.
0	9.8080675	9.8842540	9.9238135	10.0761865
1	9.8082180	9.8841479	9.9240701	10.0759299
2	9.8083684	9.8840418	9.9243266	10.0756734
3	9.8085188	9.8839357	9.9245831	10.0754169
4	9.8086690	9.8838294	9.9248396	10.0751604
5	9.8088192	9.8837232	9.9250960	10.0749040
6	9.8089692	9.8836168	9.9253524	10.0746476
7	9.8091193	9.8835104	9.9256088	10.0743912
8	9.8092691	9.8834039	9.9258652	10.0741348
9	9.8094189	9.8832974	9.9261215	10.0738783
10	9.8095686	9.8831908	9.9263778	10.0736218
11	9.8097182	9.8830841	9.9266341	10.0733653
12	9.8098678	9.8829774	9.9268904	10.0731088
13	9.8100172	9.8828706	9.9271466	10.0728524
14	9.8101666	9.8827638	9.9274028	10.0725959
15	9.8103159	9.8826568	9.9276590	10.0723394
16	9.8104650	9.8825499	9.9279152	10.0720828
17	9.8106141	9.8824428	9.9281713	10.0718263
18	9.8107631	9.8823357	9.9284274	10.0715697
19	9.8109121	9.8822285	9.9286835	10.0713131
20	9.8110609	9.8821213	9.9289396	10.0710565
21	9.8112096	9.8820140	9.9291956	10.0708000
22	9.8113583	9.8819067	9.9294516	10.0705434
23	9.8115069	9.8817992	9.9297076	10.0702868
24	9.8116554	9.8816918	9.9299636	10.0700302
25	9.8118038	9.8815842	9.9302195	10.0697736
26	9.8119521	9.8814766	9.9304755	10.0695170
27	9.8121003	9.8813689	9.9306314	10.0692604
28	9.8122484	9.8812602	9.9306872	10.0690038
29	9.8123965	9.8811534	9.9312431	10.0687472
30	9.8125444	9.8810455	9.9314989	10.0684906
	Sine Complement.	Sine.	Tangent Complement.	Tang.

49 Degrees.

Minutes.

40 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complemen.	Minutes.
30	9.8125444	9.8810455	9.9314989	10.0685011	30
31	9.8126923	9.8809376	9.9314547	10.0682453	29
32	9.8128401	9.8808296	9.9320105	10.0679895	28
33	9.8129878	9.8807215	9.9322662	10.0677338	27
34	9.8131354	9.8806134	9.9325220	10.0674708	26
35	9.8132829	9.8805052	9.9327777	10.0672223	25
36	9.8134303	9.8803970	9.9330334	10.0669666	24
37	9.8135777	9.8802887	9.9332890	10.0667110	23
38	9.8137250	9.8801803	9.9335446	10.0664554	22
39	9.8138721	9.8800719	9.9338003	10.0661997	21
40	9.8140192	9.8799634	9.9340559	10.0659441	20
41	9.8141662	9.8798548	9.9343114	10.0656886	19
42	9.8143131	9.8797462	9.9345670	10.0654330	18
43	9.8144600	9.8796375	9.9348225	10.0651775	17
44	9.8146067	9.8795287	9.9350780	10.0649220	16
45	9.8147534	9.8794199	9.9353335	10.0646665	15
46	9.8148999	9.8793110	9.9355889	10.0644111	14
47	9.8150464	9.8792021	9.9358444	10.0641556	13
48	9.8151928	9.8790930	9.9360998	10.0639002	12
49	9.8153391	9.8789840	9.9363552	10.0636448	11
50	9.8154854	9.8788748	9.9366105	10.0633895	10
51	9.8156315	9.8787656	9.9368659	10.0631341	9
52	9.8157776	9.8786563	9.9371212	10.0628788	8
53	9.8159235	9.8785470	9.9373765	10.0626235	7
54	9.8160694	9.8784376	9.9376318	10.0623682	6
55	9.8162152	9.8783281	9.9378871	10.0621129	5
56	9.8163609	9.8782186	9.9381423	10.0618577	4
57	9.8165066	9.8781090	9.9383975	10.0616025	3
58	9.8166521	9.8779994	9.9386527	10.0613473	2
59	9.8167975	9.8778896	9.9389079	10.0610921	1
60	9.8169429	9.8777799	9.9391631	10.0608369	0
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

49 Degrees.

41 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.8169429	9.8777799	9.9391631	10.0608369
1	9.8170882	9.8776700	9.9394182	10.0605818
2	9.8172334	9.8775601	9.9396733	10.0603267
3	9.8173785	9.8774501	9.9399284	10.0600716
4	9.8175235	9.8773401	9.9401835	10.0598165
5	9.8176685	9.8772300	9.9404385	10.0595614
6	9.8178138	9.8771198	9.9406936	10.0593064
7	9.8179581	9.8770096	9.9409486	10.0590514
8	9.8181028	9.8768993	9.9412036	10.0587964
9	9.8182474	9.8767889	9.9414585	10.0585414
10	9.8183919	9.8766785	9.9417135	10.0582864
11	9.8185364	9.8765680	9.9419684	10.0580314
12	9.8186807	9.8764574	9.9422233	10.0577764
13	9.8188250	9.8763468	9.9424782	10.0575214
14	9.8189692	9.8762361	9.9427331	10.0572664
15	9.8191133	9.8761253	9.9429879	10.0570114
16	9.8192575	9.8760145	9.9432428	10.0567564
17	9.8194012	9.8759036	9.9434976	10.0565014
18	9.8195450	9.8757927	9.9437524	10.0562464
19	9.8196888	9.8756816	9.9440072	10.0559914
20	9.8198325	9.8755706	9.9442619	10.0557364
21	9.8199761	9.8754594	9.9445166	10.0554814
22	9.8201196	9.8753482	9.9447714	10.0552264
23	9.8202630	9.8752369	9.9450261	10.0549714
24	9.8204063	9.8751256	9.9452807	10.0547164
25	9.8205496	9.8750142	9.9455354	10.0544614
26	9.8206927	9.8749027	9.9457900	10.0542064
27	9.8208358	9.8747912	9.9460447	10.0539514
28	9.8209788	9.8746795	9.9462993	10.0537064
29	9.8211217	9.8745679	9.9465539	10.0534514
30	9.8212646	9.8744561	9.9468084	10.0531964
	Sine Complem.	Sine.	Tangent Complem.	Tang.

48 Degrees.

41 Degrees.

Sine.	Sine Complement.	lang.	Tangent Complement.	
9.8212646	9.8744561	9.9468084	10.0531916	30
9.8214073	9.8743443	9.9470630	10.0529370	29
9.8215500	9.8742325	9.9473175	10.0526825	28
9.8216926	9.8741205	9.9473720	10.0524280	27
9.8218351	9.8740085	9.9478265	10.0521735	26
9.8219775	9.8738965	9.9480810	10.0519190	25
9.8221198	9.8737844	9.9483355	10.0516645	24
9.8222621	9.8736722	9.9485899	10.0514101	23
9.8224042	9.8735599	9.9488443	10.0511557	22
9.8225463	9.8734476	9.9490987	10.0509013	21
9.8226883	9.8733352	9.9493531	10.0506469	20
9.8228302	9.8732227	9.9496075	10.0503925	19
9.8229721	9.8731103	9.9498619	10.0501381	18
9.8231138	9.8729976	9.9501162	10.0498838	17
9.8232555	9.8728849	9.9503705	10.0496295	16
9.8233971	9.8727722	9.9506248	10.0493752	15
9.8235386	9.8726594	9.9508791	10.0491209	14
9.8236800	9.8725466	9.9511334	10.0488666	13
9.8238213	9.8724337	9.9513876	10.0486124	12
9.8239626	9.8723207	9.9516419	10.0483581	11
9.8241037	9.8722076	9.9518961	10.0481039	10
9.8242448	9.8720945	9.9521503	10.0478497	9
9.8243858	9.8719813	9.9524045	10.0475955	8
9.8245267	9.8718681	9.9526587	10.0473413	7
9.8246676	9.8717548	9.9529128	10.0470872	6
9.8248083	9.8716414	9.9531670	10.0468330	5
9.8249490	9.8715279	9.9534211	10.0465789	4
9.8250896	9.8714144	9.9536752	10.0463248	3
9.8252301	9.8713008	9.9539293	10.0460707	2
9.8253705	9.8711872	9.9541834	10.0458166	1
9.8255109	9.8710735	9.9544374	10.0455626	0
Sine Complement.	Sine.	Tangent Complement.	Tang.	Minutes.

48 Degrees.

42 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.	Minutes.
0	9.8255109	9.8710735	9.9544374	10.0455626	60
1	9.8256512	9.8709597	9.9546915	10.0453085	59
2	9.8257913	9.8708458	9.9549455	10.0450545	58
3	9.8259314	9.8707319	9.9551995	10.0448005	57
4	9.8260715	9.8706179	9.9554535	10.0445465	56
5	9.8262114	9.8705039	9.9557075	10.0442925	55
6	9.8263512	9.8703898	9.9559615	10.0440385	54
7	9.8264910	9.8702756	9.9562154	10.0437846	53
8	9.8266307	9.8701613	9.9564694	10.0435306	52
9	9.8267703	9.8700470	9.9567233	10.0432767	51
10	9.8269098	9.8699326	9.9569772	10.0430228	50
11	9.8270493	9.8698182	9.9572311	10.0427689	49
12	9.8271887	9.8697037	9.9574850	10.0425150	48
13	9.8273279	9.8695891	9.9577389	10.0422611	47
14	9.8274671	9.8694744	9.9579927	10.0420073	46
15	9.8276063	9.8693597	9.9582465	10.0417535	45
16	9.8277453	9.8692449	9.9585004	10.0414996	44
17	9.8278843	9.8691301	9.9587542	10.0412458	43
18	9.8280231	9.8690152	9.9590080	10.0409920	42
19	9.8281619	9.8689002	9.9592518	10.0407382	41
20	9.8283006	9.8687851	9.9595155	10.0404845	40
21	9.8284393	9.8686700	9.9597693	10.0402307	39
22	9.8285777	9.8685548	9.9600230	10.0399770	38
23	9.8287163	9.8684396	9.9602767	10.0397233	37
24	9.8288547	9.8683242	9.9605305	10.0394695	36
25	9.8289930	9.8682088	9.9607842	10.0392158	35
26	9.8291312	9.8680934	9.9610378	10.0389622	34
27	9.8292694	9.8679779	9.9612915	10.0387085	33
28	9.8294075	9.8678623	9.9615452	10.0384548	32
29	9.8295454	9.8677466	9.9617988	10.0382012	31
30	9.8296833	9.8676309	9.9620525	10.0379475	30
	Sine Complem.	Sine.	Tangent Complem.	Tang.	

43 Degrees.

42 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complem.
9.8296833	9.8676309	9.9620525	10.0379475
9.8298212	9.8675151	9.9623061	10.0376939
9.8299589	9.8673992	9.9625597	10.0374403
9.8300966	9.8672833	9.9628133	10.0371867
9.8302342	9.8671673	9.9630669	10.0369331
9.8303717	9.8670512	9.9633204	10.0366796
9.8305091	9.8669351	9.9635740	10.0364260
9.8306464	9.8668189	9.9638275	10.0361725
9.8307837	9.8667026	9.9640811	10.0359189
9.8309209	9.8665863	9.9643346	10.0356654
9.8310580	9.8664699	9.9645881	10.0354119
9.8311950	9.8663534	9.9648416	10.0351584
9.8313320	9.8662369	9.9650951	10.0349049
9.8314688	9.8661203	9.9653486	10.0346514
9.8316056	9.8660036	9.9656020	10.0343980
9.8317423	9.8658868	9.9658555	10.0341445
9.8318789	9.8657700	9.9661089	10.0338911
9.8320155	9.8656531	9.9663623	10.0336377
9.8321519	9.8655362	9.9666157	10.0333843
9.8322883	9.8654192	9.9668692	10.0331308
9.8324246	9.8653021	9.9671225	10.0328775
9.8325609	9.8651849	9.9673759	10.0326241
9.8326970	9.8650677	9.9676293	10.0323707
9.8328331	9.8649504	9.9678827	10.0321173
9.8329691	9.8648331	9.9681360	10.0318640
9.8331050	9.8647156	9.9683893	10.0316107
9.8332408	9.8645981	9.9686427	10.0313573
9.8333766	9.8644806	9.9688960	10.0311040
9.8335122	9.8643629	9.9691483	10.0308507
9.8336487	9.8642452	9.9694026	10.0305974
9.8337833	9.8641275	9.9696559	10.0303441
Sine Complem.	Sine.	Tang. Complem.	Tang.

47 Degrees.

Minutes.

43 Degrees.

Minutes.

	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.8337833	9.8641275	9.9696559	10.0303441
1	9.8339188	9.8640096	9.9699091	10.0300909
2	9.8340541	9.8638917	9.9701624	10.0298376
3	9.8341894	9.8637737	9.9704157	10.0295843
4	9.8343246	9.8636557	9.9706689	10.0293311
5	9.8344597	9.8635376	9.9709221	10.0290778
6	9.8345948	9.8634194	9.9711754	10.0288246
7	9.8347297	9.8633011	9.9714286	10.0285714
8	9.8348646	9.8631828	9.9716818	10.0283182
9	9.8349994	9.8630644	9.9719350	10.0280650
10	9.8351341	9.8629460	9.9721882	10.0278118
11	9.8352688	9.8628274	9.9724413	10.0275586
12	9.8354033	9.8627088	9.9726945	10.0273054
13	9.8355378	9.8625902	9.9729477	10.0270522
14	9.8356722	9.8624714	9.9732008	10.0267990
15	9.8358066	9.8623526	9.9734539	10.0265458
16	9.8359408	9.8622338	9.9737071	10.0262926
17	9.8360750	9.8621148	9.9739602	10.0260394
18	9.8362091	9.8619958	9.9742133	10.0257862
19	9.8363431	9.8618767	9.9744664	10.0255330
20	9.8364771	9.8617576	9.9747195	10.0252798
21	9.8366109	9.8616383	9.9749726	10.0250266
22	9.8367447	9.8615190	9.9752257	10.0247734
23	9.8368784	9.8613997	9.9754787	10.0245202
24	9.8370121	9.8612803	9.9757318	10.0242670
25	9.8371456	9.8611608	9.9759849	10.0240138
26	9.8372791	9.8610412	9.9762379	10.0237606
27	9.8374125	9.8609215	9.9764909	10.0235074
28	9.8375458	9.8608018	9.9767440	10.0232542
29	9.8376790	9.8606821	9.9769970	10.0230010
30	9.8378122	9.8605622	9.9772500	10.0227478
	Sine Complem.	Sine.	Tangent Complem.	Tang.

46 Degrees.

45 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complemen.
9.8378122	9.8609622	9.9772500	10.0227500 30
9.8379453	9.8604423	9.9775030	10.0224970 29
9.8380783	9.8603223	9.9777560	10.0222440 28
9.8382112	9.8602022	9.9780090	10.0219910 27
9.8383441	9.8600821	9.9782620	10.0217380 26
9.8384769	9.8599619	9.9785149	10.0214851 25
9.8386096	9.8598416	9.9787679	10.0212321 24
9.8387422	9.8597213	9.9790209	10.0209791 23
9.8388747	9.8596009	9.9792738	10.0207262 22
9.8390072	9.8594804	9.9795268	10.0204732 21
9.8391396	9.8593599	9.9797797	10.0202203 20
9.8392719	9.8592393	9.9800326	10.0199674 19
9.8394041	9.8591186	9.9802856	10.0197144 18
9.8395363	9.8589978	9.9805385	10.0194615 17
9.8396684	9.8588770	9.9807914	10.0192086 16
9.8398004	9.8587561	9.9810443	10.0189557 15
9.8399323	9.8586351	9.9812972	10.0187028 14
9.8400642	9.8585141	9.9815501	10.0184499 13
9.8401959	9.8583929	9.9818030	10.0181970 12
9.8403276	9.8582718	9.9820559	10.0179441 11
9.8404593	9.8581505	9.9823087	10.0176913 10
9.8405908	9.8580292	9.9825616	10.0174384 9
9.8407223	9.8579078	9.9828145	10.0171855 8
9.8408537	9.8577863	9.9830673	10.0169327 7
9.8409850	9.8576648	9.9833202	10.0166798 6
9.8411162	9.8575432	9.9835730	10.0164270 5
9.8412474	9.8574215	9.9838259	10.0161741 4
9.8413785	9.8572998	9.9840787	10.0159213 3
9.8415095	9.8571779	9.9843315	10.0156685 2
9.8416404	9.8570561	9.9845844	10.0154156 1
9.8417713	9.8569341	9.9848372	10.0151628 0
Sine Complem.	Sine.	Tangent Complem.	Tang.

46 Degrees.

Minutes.

44 Degrees.

Minutes.	Sine.	Sine Complem.	Tang.	Tangent Complem.
0	9.8417713	9.8569341	9.9848372	10.0151628
1	9.8419021	9.8568121	9.9850990	10.0149100
2	9.8420328	9.8566900	9.9853428	10.0146572
3	9.8421634	9.8565678	9.9855956	10.0144044
4	9.8422939	9.8564455	9.9858484	10.0141516
5	9.8424244	9.8563232	9.9861012	10.0138988
6	9.8425548	9.8562008	9.9863540	10.0136460
7	9.8426851	9.8560784	9.9866068	10.0133932
8	9.8428154	9.8559558	9.9868596	10.0131404
9	9.8429456	9.8558332	9.9871123	10.0128877
10	9.8430757	9.8557106	9.9873651	10.0126349
11	9.8432057	9.8555878	9.9876179	10.0123821
12	9.8433356	9.8554650	9.9878706	10.0121294
13	9.8434655	9.8553421	9.9881234	10.0118766
14	9.8435953	9.8552192	9.9883761	10.0116239
15	9.8437250	9.8550961	9.9886289	10.0113711
16	9.8438547	9.8549730	9.9888816	10.0111184
17	9.8439842	9.8548499	9.9891344	10.0108656
18	9.8441137	9.8547266	9.9893871	10.0106129
19	9.8442432	9.8546033	9.9896399	10.0103601
20	9.8443725	9.8544799	9.9898926	10.0101074
21	9.8445018	9.8543564	9.9901453	10.0098547
22	9.8446310	9.8542329	9.9903981	10.0096019
23	9.8447601	9.8541093	9.9906508	10.0093492
24	9.8448891	9.8539856	9.9909035	10.0090965
25	9.8450181	9.8538619	9.9911562	10.0088438
26	9.8451470	9.8537381	9.9914089	10.0085911
27	9.8452758	9.8536142	9.9916616	10.0083384
28	9.8454055	9.8534902	9.9919143	10.0080857
29	9.8455332	9.8533662	9.9921670	10.0078330
30	9.8456618	9.8532421	9.9924197	10.0075803
	Sine Complem.	Sine.	Tangent Complem.	Tang.

45 Degrees.

44 Degrees.

Sine.	Sine Complem.	Tang.	Tangent Complemen.
9.8456618	9.8532421	9.9924197	10.0075803 30
9.8457903	9.8531179	9.9926724	10.0073279 29
9.8459188	9.8529936	9.9926251	10.0070749 28
9.8460471	9.8528693	9.9931778	10.0068222 27
9.8461754	9.8527449	9.9934305	10.0065695 26
9.8463036	9.8526204	9.9936832	10.0063168 25
9.8464318	9.8524959	9.9939359	10.0060648 24
9.8465599	9.8523713	9.9941886	10.0058114 23
9.8466879	9.8522466	9.9944431	10.0055587 22
9.8468158	9.8521218	9.9946940	10.0053060 21
9.8469436	9.8519970	9.9949466	10.0050534 20
9.8470714	9.8518721	9.9951993	10.0048007 19
9.8471991	9.8517471	9.9954520	10.0045480 18
9.8473267	9.8516220	9.9957047	10.0042953 17
9.8474543	9.8514969	9.9959573	10.0040427 16
9.8475817	9.8513717	9.9962100	10.0037900 15
9.8477091	9.8512465	9.9964627	10.0035373 14
9.8478365	9.8511211	9.9967154	10.0032846 13
9.8479637	9.8509957	9.9969680	10.0030320 12
9.8480909	9.8508702	9.9972207	10.0027793 11
9.8482180	9.8507446	9.9974734	10.0025266 10
9.8483450	9.8506190	9.9977260	10.0022740 9
9.8484720	9.8504933	9.9979787	10.0020213 8
9.8485989	9.8503675	9.9982314	10.0017686 7
9.8487257	9.8502417	9.9984840	10.0015110 6
9.8488524	9.8501157	9.9987367	10.0012633 5
9.8489791	9.8499897	9.9989893	10.0010107 4
9.8491057	9.8498637	9.9992420	10.0007580 3
9.8492322	9.8497375	9.9994947	10.0005053 2
9.8493586	9.8496113	9.9997473	10.0002527 1
9.8494850	9.8494850	10.0000000	10.0000000 0
Sine Complem.	Sine.	Tangent Complem.	Tang.

45 Degrees.

Here followeth a T A
B L E of *Logarithms* of Ab-
solute Numbers, from an Unit
to 10000. Carefully Cor-
rected.

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1	0.0000000	38	1.5797836	75	1.8750613
2	0.3010300	39	1.5910646	76	1.8808136
3	0.4771212	40	1.6020600	77	1.8864907
4	0.6020600	41	1.6127839	78	1.8920946
5	0.6989700	42	1.6232493	79	1.8976271
6	0.7781512	43	1.6334685	80	1.9030900
7	0.8450980	44	1.6434527	81	1.9084850
8	0.9030900	45	1.6532125	82	1.9138138
9	0.9542425	46	1.6627578	83	1.9190781
10	1.0000000	47	1.6720979	84	1.9242793
11	1.0413927	48	1.6812412	85	1.9294189
12	1.0791812	49	1.6901601	86	1.9344984
13	1.11139433	50	1.6989700	87	1.9394192
14	1.1461280	51	1.7075702	88	1.9444827
15	1.1760913	52	1.7160033	89	1.9493900
16	1.2041200	53	1.7242759	90	1.9542425
17	1.2304489	54	1.7323938	91	1.9590414
18	1.2552725	55	1.7403627	92	1.9637878
19	1.2787536	56	1.7481880	93	1.9684829
20	1.3010300	57	1.7568748	94	1.9731278
21	1.3222193	58	1.7634280	95	1.9777236
22	1.3424227	59	1.7708520	96	1.9822712
23	1.3617278	60	1.7781512	97	1.9867717
24	1.3802112	61	1.7853298	98	1.9912261
25	1.3979400	62	1.7923917	99	1.9956352
26	1.4149733	63	1.7993405	100	2.0000000
27	1.4313638	64	1.8061800	101	2.0043214
28	1.4471580	65	1.8129133	102	2.0086002
29	1.4623980	66	1.8195439	103	2.0128372
30	1.4771212	67	1.8260748	104	2.0170333
31	1.4913617	68	1.8325089	105	2.0211892
32	1.5051500	69	1.8388491	106	2.0253059
33	1.5185139	70	1.8450980	107	2.0293838
34	1.5314789	71	1.8512583	108	2.0334238
35	1.5440680	72	1.8573325	109	2.0374265
36	1.5563025	73	1.8633229	110	2.0413927
37	1.5682817	74	1.8692317	111	2.0453230

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
112	2.0492184	149	2.1731863	186	2.2665129
113	2.0530784	150	2.1760913	187	2.2718416
114	2.0569048	151	2.1789769	188	2.2741571
115	2.0606978	152	2.1818436	189	2.2764611
116	2.0644580	153	2.1846914	190	2.2787536
117	2.0681859	154	2.1875207	191	2.2810344
118	2.0718820	155	2.1903317	192	2.2833012
119	2.0755470	156	2.1931246	193	2.2855573
120	2.0791812	157	2.1958996	194	2.2878017
121	2.0827854	158	2.1986571	195	2.2900344
122	2.0863598	159	2.2013971	196	2.2922561
123	2.0899051	160	2.2041200	197	2.2944662
124	2.0934217	161	2.2068259	198	2.2966651
125	2.0969100	162	2.2095150	199	2.2988531
126	2.1003705	163	2.2121876	200	2.3010300
127	2.1038037	164	2.2148438	201	2.3031961
128	2.1072100	165	2.2174839	202	2.3053514
129	2.1105897	166	2.2201081	203	2.3074960
130	2.1139433	167	2.2227165	204	2.3096300
131	2.1172713	168	2.2253093	205	2.3117537
132	2.1205739	169	2.2278867	206	2.3138672
133	2.1238516	170	2.2304489	207	2.3159709
134	2.1271048	171	2.2329961	208	2.3180633
135	2.1303338	172	2.2355284	209	2.3201449
136	2.1335385	173	2.2380461	210	2.3222159
137	2.1367206	174	2.2405492	211	2.3242764
138	2.1398791	175	2.2430380	212	2.3263264
139	2.1430148	176	2.2455127	213	2.3283759
140	2.1461280	177	2.2479733	214	2.3304139
141	2.1492191	178	2.2504200	215	2.3324394
142	2.1522883	179	2.2528530	216	2.3344537
143	2.1553360	180	2.2552725	217	2.3364567
144	2.1583625	181	2.2576736	218	2.3384484
145	2.1613680	182	2.2590071	219	2.3404289
146	2.1643528	183	2.2624511	220	2.3423981
147	2.1673173	184	2.2648178	221	2.3443561
148	2.1702617	185	2.2671717	222	2.3463039

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
223	2.2483049	260	2.4149733	297	2.4727564
224	2.3502480	261	2.4166405	298	2.4742163
225	2.3521825	262	2.4183013	299	2.4755712
226	2.3541084	263	2.4199557	300	2.4771212
227	2.3560259	264	2.4216039	301	2.4785665
228	2.3579348	265	2.4232459	302	2.4800069
229	2.3598355	266	2.4248816	303	2.4814426
230	2.3617278	267	2.4265113	304	2.4828736
231	2.3636120	268	2.4281348	305	2.4842998
232	2.3654880	269	2.4297523	306	2.4857214
233	2.3673559	270	2.4313638	307	2.4871384
234	2.3692159	271	2.4329693	308	2.4885507
235	2.3710679	272	2.4345689	309	2.4899585
236	2.3729120	273	2.4361626	310	2.4913617
237	2.3747483	274	2.4377506	311	2.4927604
238	2.3765770	275	2.4393327	312	2.4941546
239	2.3783979	276	2.4409091	313	2.4955443
240	2.3802112	277	2.4424798	314	2.4969296
241	2.3820170	278	2.4440448	315	2.4983105
242	2.3838154	279	2.4456042	316	2.4996871
243	2.3856063	280	2.4471580	317	2.5010593
244	2.3873898	281	2.4487063	318	2.5024271
245	2.3891661	282	2.4502491	319	2.5037907
246	2.3909351	283	2.4517864	320	2.5051500
247	2.3926969	284	2.4533183	321	2.5065050
248	2.3944517	285	2.4548440	322	2.5078559
249	2.3961993	286	2.4563660	323	2.5092025
250	2.3979400	287	2.4578819	324	2.5105450
251	2.3996737	288	2.4593925	325	2.5118834
252	2.4014005	289	2.4608978	326	2.5132176
253	2.4031205	290	2.4623980	327	2.5145477
254	2.4048366	291	2.4638930	328	2.5158738
255	2.4065402	292	2.4653828	329	2.5171959
256	2.4082400	293	2.4668676	330	2.5185139
257	2.4099331	294	2.4683473	331	2.5198280
258	2.4116197	295	2.4698220	332	2.5211381
259	2.4132998	296	2.4712917	333	2.5224442

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
334	2.5237465	371	2.5693739	408	2.6106602
335	2.5250448	372	2.5705429	409	2.6117233
336	2.5263393	373	2.5717088	410	2.6127839
337	2.5276299	374	2.5728716	411	2.6138418
338	2.5289167	375	2.5740313	412	2.6148971
339	2.5301927	376	2.5751878	413	2.6159500
340	2.5314789	377	2.5763413	414	2.6170009
341	2.5327544	378	2.5774918	415	2.6180481
342	2.5340261	379	2.5786392	416	2.6190933
343	2.5352941	380	2.5797836	417	2.6201360
344	2.5365584	381	2.5809250	418	2.6211771
345	2.5378191	382	2.5820634	419	2.6222167
346	2.5390761	383	2.5831988	420	2.6232549
347	2.5403295	384	2.5843312	421	2.6242911
348	2.5415792	385	2.5854607	422	2.6253254
349	2.5428254	386	2.5865873	423	2.6263580
350	2.5440680	387	2.5877110	424	2.6273889
351	2.5453071	388	2.5888317	425	2.6284181
352	2.5465427	389	2.5899496	426	2.6294457
353	2.5477747	390	2.5910646	427	2.6304717
354	2.5490033	391	2.5921768	428	2.6314961
355	2.5502283	392	2.5932861	429	2.6325190
356	2.5514500	393	2.5943925	430	2.6335404
357	2.5526682	394	2.5954962	431	2.6345604
358	2.5538830	395	2.5965971	432	2.6355790
359	2.5550944	396	2.5976952	433	2.6365962
360	2.5563025	397	2.5987905	434	2.6376120
361	2.5575072	398	2.5998831	435	2.6386264
362	2.5587086	399	2.6009729	436	2.6396394
363	2.5599066	400	2.6020600	437	2.6406510
364	2.5611014	401	2.6031444	438	2.6416612
365	2.5622929	402	2.6042260	439	2.6426700
366	2.5634811	403	2.6053050	440	2.6436774
367	2.5646661	404	2.6063814	441	2.6446834
368	2.5658478	405	2.6074550	442	2.6456880
369	2.5670264	406	2.6085260	443	2.6466912
370	2.5682017	407	2.6095944	444	2.6476930

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
45	2.6483600	482	2.6830470	519	2.7151674
46	2.6493349	483	2.6839471	520	2.7160033
47	2.6503075	484	2.6848454	521	2.7168377
48	2.6512780	485	2.6857417	522	2.7176705
49	2.6522463	486	2.6866368	523	2.7185017
50	2.6532125	487	2.6875290	524	2.7193313
51	2.6541765	488	2.6884198	525	2.7201593
52	2.6551384	489	2.6893089	526	2.7209857
53	2.6560982	490	2.6901961	527	2.7218106
54	2.6570558	491	2.6910815	528	2.7226339
55	2.6580114	492	2.6919651	529	2.7234557
56	2.6589648	493	2.6928469	530	2.7242759
57	2.6599162	494	2.6937269	531	2.7250945
58	2.6608655	495	2.6946052	532	2.7259116
59	2.6618127	496	2.6954817	533	2.7267272
60	2.6627578	497	2.6963564	534	2.7275413
61	2.6637009	498	2.6972293	535	2.7283583
62	2.6646420	499	2.6981005	536	2.7291648
63	2.6655810	500	2.6989700	537	2.7299743
64	2.6665180	501	2.6998377	538	2.7307823
65	2.6674529	502	2.7007037	539	2.7315888
66	2.6683859	503	2.7015680	540	2.7323938
67	2.6693169	504	2.7024305	541	2.7331973
68	2.6702458	505	2.7032914	542	2.7339993
69	2.6711728	506	2.7041505	543	2.7347998
70	2.6720979	507	2.7050080	544	2.7355989
71	2.6730209	508	2.7058637	545	2.7363965
72	2.6739420	509	2.7067178	546	2.7371926
73	2.6748611	510	2.7075702	547	2.7379873
74	2.6757783	511	2.7084209	548	2.7387806
75	2.6766936	512	2.7092700	549	2.7395723
76	2.6776069	513	2.7101174	550	2.7403627
77	2.6785184	514	2.7109631	551	2.7411516
78	2.6794279	515	2.7118072	552	2.7419391
79	2.6803355	516	2.7126497	553	2.7427251
80	2.6812412	517	2.7134905	554	2.7435098
81	2.6821451	518	2.7143298	555	2.7442930

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
556	2.7450748	593	2.7730547	630	2.7993409
557	2.7458552	594	2.7737864	631	2.8000294
558	2.7466342	595	2.7745170	632	2.8007177
559	2.7474118	596	2.7752463	633	2.8014031
560	2.7481880	597	2.7759743	634	2.8020899
561	2.7489629	598	2.7767012	635	2.8027737
562	2.7497363	599	2.7774268	636	2.8034571
563	2.7505084	600	2.7781512	637	2.8041394
564	2.7512791	601	2.7788745	638	2.8048207
565	2.7520484	602	2.7795965	639	2.8055009
566	2.7528164	603	2.7803173	640	2.8061800
567	2.7535831	604	2.7810369	641	2.8068580
568	2.7543483	605	2.7817554	642	2.8075350
569	2.7551123	606	2.7824726	643	2.8082110
570	2.7558748	607	2.7831887	644	2.8088859
571	2.7566361	608	2.7839036	645	2.8095597
572	2.7573960	609	2.7846173	646	2.8102325
573	2.7581546	610	2.7853298	647	2.8109043
574	2.7589119	611	2.7860412	648	2.8115750
575	2.7596678	612	2.7867514	649	2.8122447
576	2.7604225	613	2.7874605	650	2.8129134
577	2.7611758	614	2.7881684	651	2.8135810
578	2.7619278	615	2.7888751	652	2.8142476
579	2.7626786	616	2.7895807	653	2.8149132
580	2.7634280	617	2.7902852	654	2.8155777
581	2.7641761	618	2.7909885	655	2.8162413
582	2.7649230	619	2.7916906	656	2.8169038
583	2.7656685	620	2.7923917	657	2.8175654
584	2.7664128	621	2.7930916	658	2.8182259
585	2.7671559	622	2.7937904	659	2.8188854
586	2.7678976	623	2.7944880	660	2.8195439
587	2.7686381	624	2.7951846	661	2.8202015
588	2.7693773	625	2.7958800	662	2.8208580
589	2.7701153	626	2.7965744	663	2.8215135
590	2.7708520	627	2.7972575	664	2.8221681
591	2.7715875	628	2.7979596	665	2.8228216
592	2.7723217	629	2.7986506	666	2.8234743

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
667	2.8241258	704	2.8475727	741	2.8698182
668	2.8247765	705	2.8481891	742	2.8704039
669	2.8254261	706	2.8488047	743	2.8709888
670	2.8260748	707	2.8494194	744	2.8715729
671	2.8267225	708	2.8500333	745	2.8721563
672	2.8273693	709	2.8506462	746	2.8727388
673	2.8280151	710	2.8512583	747	2.8733206
674	2.8286599	711	2.8518696	748	2.8739016
675	2.8293038	712	2.8524800	749	2.8744818
676	2.8299467	713	2.8530895	750	2.8750613
677	2.8305887	714	2.8536982	751	2.8756399
678	2.8312297	715	2.8543060	752	2.8762178
679	2.8318698	716	2.8549130	753	2.8767950
680	2.8325089	717	2.8555191	754	2.8773713
681	2.8331471	718	2.8561244	755	2.8779469
682	2.8337844	719	2.8567289	756	2.8785218
683	2.8344207	720	2.8573325	757	2.8790959
684	2.8350561	721	2.8579353	758	2.8796692
685	2.8356906	722	2.8585372	759	2.8802418
686	2.8363241	723	2.8591383	760	2.8808136
687	2.8369567	724	2.8597386	761	2.8813847
688	2.8375884	725	2.8603380	762	2.8819550
689	2.8382192	726	2.8609366	763	2.8825245
690	2.8388491	727	2.8615344	764	2.8830934
691	2.8394780	728	2.8621314	765	2.8836614
692	2.8401061	729	2.8627275	766	2.8842288
693	2.8407332	730	2.8633229	767	2.8847954
694	2.8413595	731	2.8639174	768	2.8853612
695	2.8419848	732	2.8645111	769	2.8859263
696	2.8426092	733	2.8651040	770	2.8864907
697	2.8432329	734	2.8656961	771	2.8870544
698	2.8438554	735	2.8662873	772	2.8876173
699	2.8444772	736	2.8668778	773	2.8881795
700	2.8450980	737	2.8674675	774	2.8887410
701	2.8457180	738	2.8680564	775	2.8893017
702	2.8463371	739	2.8686444	776	2.8898617
703	2.8469553	740	2.8692317	777	2.8904210

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
778	2.8909796	815	2.9111576	852	2.9304396
779	2.8915375	816	2.9116901	853	2.9309490
780	2.8920946	817	2.9122220	854	2.9314579
781	2.8926510	818	2.9127533	855	2.9319661
782	2.8932067	819	2.9132839	856	2.9324738
783	2.8937618	820	2.9138138	857	2.9329808
784	2.8943161	821	2.9143431	858	2.9334877
785	2.8948696	822	2.9148781	859	2.9339933
786	2.8954225	823	2.9153998	860	2.9344984
787	2.8959747	824	2.9159272	861	2.9350031
788	2.8965262	825	2.9164539	862	2.9355077
789	2.8970770	826	2.9169800	863	2.9360108
790	2.8976271	827	2.9175055	864	2.9365137
791	2.8981765	828	2.9180303	865	2.9370161
792	2.8987252	829	2.9185545	866	2.9375179
793	2.8992732	830	2.9190781	867	2.9380191
794	2.8998205	831	2.9196010	868	2.9385197
795	2.9003671	832	2.9201233	869	2.9390198
796	2.9009131	833	2.9206450	870	2.9395194
797	2.9014583	834	2.9211660	871	2.9400181
798	2.9020029	835	2.9216865	872	2.9405165
799	2.9025468	836	2.9222063	873	2.9410142
800	2.9030900	837	2.9227254	874	2.9415114
801	2.9036325	838	2.9232440	875	2.9420080
802	2.9041744	839	2.9237620	876	2.9425041
803	2.9047155	840	2.9242793	877	2.9430000
804	2.9052560	841	2.9247960	878	2.9434955
805	2.9057959	842	2.9253121	879	2.9439907
806	2.9063350	843	2.9258276	880	2.9444857
807	2.9068735	844	2.9263424	881	2.9449799
808	2.9074114	845	2.9268567	882	2.9454736
809	2.9079485	846	2.9273704	883	2.9459667
810	2.9084850	847	2.9278834	884	2.9464593
811	2.9090208	848	2.9283958	885	2.9469513
812	2.9095560	849	2.9289077	886	2.9474437
813	2.9100905	850	2.9294189	887	2.9479356
814	2.9106244	851	2.9299296	888	2.9484269

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
889	2.9489018	926	2.9666110	963	2.9836263
890	2.9493900	927	2.9670797	964	2.9840770
891	2.9498777	928	2.9675380	965	2.9845273
892	2.9503648	929	2.9680157	966	2.9849771
893	2.9508514	930	2.9684829	967	2.9854265
894	2.9513375	931	2.9689497	968	2.9858753
895	2.9518230	932	2.9694159	969	2.9863238
896	2.9523080	933	2.9698816	970	2.9867717
897	2.9527924	934	2.9703469	971	2.9872192
898	2.9532763	935	2.9708116	972	2.9876663
899	2.9537597	936	2.9712758	973	2.9881128
900	2.9542425	937	2.9717396	974	2.9885589
901	2.9547248	938	2.9722028	975	2.9890046
902	2.9552065	939	2.9726656	976	2.9894498
903	2.9556877	940	2.9731278	977	2.9898946
904	2.9561684	941	2.9735896	978	2.9903388
905	2.9566486	942	2.9740509	979	2.9907827
906	2.9561282	943	2.9745117	980	2.9912261
907	2.9576073	944	2.9749720	981	2.9916690
908	2.9580858	945	2.9754318	982	2.9921115
909	2.9585639	946	2.9758911	983	2.9925535
910	2.9590414	947	2.9763500	984	2.9929951
911	2.9595184	948	2.9768083	985	2.9934362
912	2.9599948	949	2.9772662	986	2.9938769
913	2.9604708	950	2.9777236	987	2.9943171
914	2.9609462	951	2.9781805	988	2.9947569
915	2.9614211	952	2.9786369	989	2.9951963
916	2.9618955	953	2.9790929	990	2.9956352
917	2.9623693	954	2.9795384	991	2.9960736
918	2.9628427	955	2.9800034	992	2.9965117
919	2.9633155	956	2.9804579	993	2.9969492
920	2.9637878	957	2.9809119	994	2.9963864
921	2.9642596	958	2.9813655	995	2.9978231
922	2.9647309	959	2.9818186	996	2.9982593
923	2.9652017	960	2.9822712	997	2.9986951
924	2.9656720	961	2.9827234	998	2.9991305
925	2.9661417	962	2.9831751	999	2.9995655

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1000	3.0000000	1037	3.0157787	1074	3.0310043
1001	3.0004341	1038	3.0161973	1075	3.0314085
1002	3.0008677	1039	3.0166153	1076	3.0318123
1003	3.0013009	1040	3.0170335	1077	3.0322157
1004	3.0017337	1041	3.0174507	1078	3.0326188
1005	3.0021661	1042	3.0178677	1079	3.0330214
1006	3.0025980	1043	3.0182843	1080	3.0334257
1007	3.0030295	1044	3.0187005	1081	3.0338257
1008	3.0034605	1045	3.0191163	1082	3.0342273
1009	3.0038912	1046	3.0195317	1083	3.0346284
1010	3.0043213	1047	3.0199467	1084	3.0350293
1011	3.0047511	1048	3.0203613	1085	3.0354297
1012	3.0051805	1049	3.0207755	1086	3.0358298
1013	3.0056094	1050	3.0211893	1087	3.0362295
1014	3.0060379	1051	3.0216027	1088	3.0366289
1015	3.0064660	1052	3.0220157	1089	3.0370279
1016	3.0068937	1053	3.0224284	1090	3.0374265
1017	3.0073209	1054	3.0228406	1091	3.0378247
1018	3.0077478	1055	3.0232524	1092	3.0382226
1019	3.0081742	1056	3.0236639	1093	3.0386201
1020	3.0086002	1057	3.0240750	1094	3.0390173
1021	3.0090257	1058	3.0244857	1095	3.0394141
1022	3.0094509	1059	3.0248960	1096	3.0398105
1023	3.0098756	1060	3.0253059	1097	3.0402066
1024	3.0102999	1061	3.0257154	1098	3.0406023
1025	3.0107239	1062	3.0261245	1099	3.0410377
1026	3.0111474	1063	3.0265333	1100	3.0414927
1027	3.0115704	1064	3.0269416	1101	3.0418773
1028	3.0119931	1065	3.0273496	1102	3.0422816
1029	3.0124154	1066	3.0277572	1103	3.0426755
1030	3.0128372	1067	3.0281644	1104	3.0430691
1031	3.0132587	1068	3.0285712	1105	3.0434623
1032	3.0136797	1069	3.0289777	1106	3.0438551
1033	3.0141003	1070	3.0293838	1107	3.0442476
1034	3.0145205	1071	3.0297895	1108	3.0446398
1035	3.0149403	1072	3.0301948	1109	3.0450315
1036	3.0153597	1073	3.0305997	1110	3.0454230

Logarithm.	Num.	Logarithm.	Num.	Logarithm.
13.0457140	1148	3.0599419	1185	3.0737183
123.0461048	1149	3.0603200	1186	3.0740847
133.0464952	1150	3.0606978	1187	3.0744507
143.0468852	1151	3.0610753	1188	3.0748164
153.0472749	1152	3.0614525	1189	3.0751818
163.0476642	1153	3.0618293	1190	3.0755470
173.0480532	1154	3.0622058	1191	3.0759118
183.0484418	1155	3.0625820	1192	3.0762762
193.0488301	1156	3.0629578	1193	3.0766404
203.0492180	1157	3.0633334	1194	3.0770043
213.0496056	1158	3.0637085	1195	3.0773679
223.0499928	1159	3.0640834	1196	3.0777312
233.0503797	1160	3.0544580	1197	3.0780941
243.0507663	1161	3.0648322	1198	3.0784568
253.0511525	1162	3.0652061	1199	3.0788192
263.0515384	1163	3.0655797	1200	3.0791812
273.0519239	1164	3.0659530	1201	3.0795430
283.0523091	1165	3.0663259	1202	3.0799045
293.0526939	1166	3.0666985	1203	3.0802656
303.0530784	1167	3.0670708	1204	3.0806265
313.0534626	1168	3.0674428	1205	3.0809870
323.0538464	1169	3.0678145	1206	3.0813473
333.0542299	1170	3.0681859	1207	3.0817073
343.0546130	1171	3.0685569	1208	3.0820669
353.0549958	1172	3.0689276	1209	3.0824263
363.0553783	1173	3.0692980	1210	3.0827854
373.0557604	1174	3.0696681	1211	3.0831441
383.0561423	1175	3.0700379	1212	3.0835026
393.0565237	1176	3.0704073	1213	3.0838608
403.0569048	1177	3.0707765	1214	3.0842187
413.0572856	1178	3.0711453	1215	3.0845763
423.0576661	1179	3.0715138	1216	3.0849336
433.0580462	1180	3.0718820	1217	3.0852906
443.0584260	1181	3.0722499	1218	3.0856473
453.0588055	1182	3.0726175	1219	3.0860037
463.0591846	1183	3.0729847	1220	3.0863598
473.0595634	1184	3.0733517	1221	3.0867156

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1222	3.0870712	1259	3.1000257	1296	3.11260
1223	3.0874264	1260	3.1003705	1297	3.11299
1224	3.0877814	1261	3.1007151	1298	3.11337
1225	3.0881361	1262	3.1010593	1299	3.11376
1226	3.0884905	1263	3.1014033	1300	3.11414
1227	3.0888446	1264	3.1017471	1301	3.11452
1228	3.0891984	1265	3.1020905	1302	3.11490
1229	3.0895519	1266	3.1024337	1303	3.11528
1230	3.0899051	1267	3.1027766	1304	3.11566
1231	3.0902580	1268	3.1031192	1305	3.11604
1232	3.0906107	1269	3.1034616	1306	3.11642
1233	3.0909631	1270	3.1038030	1307	3.11679
1234	3.0913151	1271	3.1041455	1308	3.11717
1235	3.0916669	1272	3.1044871	1309	3.11755
1236	3.0920185	1273	3.1048284	1310	3.11793
1237	3.0923697	1274	3.1051694	1311	3.11831
1238	3.0927209	1275	3.1055102	1312	3.11869
1239	3.0930713	1276	3.1058507	1313	3.11907
1240	3.0934217	1277	3.1061909	1314	3.11945
1241	3.0937718	1278	3.1065308	1315	3.11983
1242	3.0941216	1279	3.1068705	1316	3.12021
1243	3.0944711	1280	3.1072100	1317	3.12059
1244	3.0948204	1281	3.1075491	1318	3.12097
1245	3.0951693	1282	3.1078880	1319	3.12135
1246	3.0955180	1283	3.1082266	1320	3.12173
1247	3.0958664	1284	3.1085650	1321	3.12211
1248	3.0962146	1285	3.1089031	1322	3.12249
1249	3.0965624	1286	3.1092410	1323	3.12287
1250	3.0969100	1287	3.1095785	1324	3.12325
1251	3.0972573	1288	3.1099159	1325	3.12363
1252	3.0976043	1289	3.1102529	1326	3.12401
1253	3.0979511	1290	3.1105897	1327	3.12439
1254	3.0982975	1291	3.1109262	1328	3.12477
1255	3.0986437	1292	3.1112625	1329	3.12515
1256	3.0989806	1293	3.1115985	1330	3.12553
1257	3.0993253	1294	3.1119343	1331	3.12591
1258	3.0996806	1295	3.1122698	1332	3.12629

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
33	3.1248301	1370	3.1367206	1407	3.1482941
34	3.1251558	1371	3.1370374	1408	3.1486026
35	3.1254813	1372	3.1373541	1509	3.1489110
36	3.1258064	1373	3.1376705	1410	3.1492191
37	3.1261314	1374	3.1379867	1411	3.1495270
38	3.1264561	1375	3.1383027	1412	3.1498347
39	3.1267806	1376	3.1386184	1413	3.1501422
40	3.1271048	1377	3.1389339	1414	3.1504494
41	3.1274288	1378	3.1392492	1415	3.1507564
42	3.1277525	1379	3.1395643	1416	3.1510632
43	3.1280760	1380	3.1398791	1417	3.1513698
44	3.1283993	1381	3.1401937	1418	3.1516762
45	3.1287223	1382	3.1405080	1419	3.1519824
46	3.1290450	1383	3.1408222	1420	3.1522883
47	3.1293676	1384	3.1411361	1421	3.1525941
48	3.1296899	1385	3.1414498	1422	3.1528996
49	3.1300119	1386	3.1417632	1423	3.1532049
50	3.1303338	1387	3.1420765	1424	3.1535100
51	3.1306553	1388	3.1423895	1425	3.1538149
52	3.1309767	1389	3.1427022	1426	3.1541195
53	3.1312978	1390	3.1430148	1427	3.1544240
54	3.1316187	1391	3.1433271	1428	3.1547282
55	3.1319393	1392	3.1436392	1429	3.1550322
56	3.1322597	1393	3.1439511	1430	3.1553360
57	3.1325798	1394	3.1442628	1431	3.1556396
58	3.1328998	1395	3.1445742	1432	3.1559430
59	3.1332195	1396	3.1448854	1433	3.1562462
60	3.1335389	1397	3.1451964	1434	3.1565491
61	3.1338581	1398	3.1455072	1435	3.1568519
62	3.1341771	1399	3.1458177	1436	3.1571544
63	3.1344958	1400	3.1461280	1437	3.1574568
64	3.1348144	1401	3.1464381	1438	3.1577589
65	3.1351326	1402	3.1467480	1439	3.1580608
66	3.1354507	1403	3.1470577	1440	3.1583625
67	3.1357685	1404	3.1473671	1441	3.1586640
68	3.1360861	1405	3.1476763	1442	3.1589653
69	3.1364034	1406	3.1479853	1443	3.1592663

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1444	3.1595672	1481	3.1705550	1518	3.18127	1555	3.19200
1445	3.1598678	1482	3.1708482	1519	3.18157	1556	3.19230
1446	3.1601683	1483	3.1711411	1520	3.18192	1557	3.19260
1447	3.1604685	1484	3.1714339	1521	3.18227	1558	3.19290
1448	3.1607686	1485	3.1717264	1522	3.18262	1559	3.19320
1449	3.1610684	1486	3.1720188	1523	3.18297	1560	3.19350
1450	3.1613680	1487	3.1723110	1524	3.18332	1561	3.19380
1451	3.1616674	1488	3.1726029	1525	3.18367	1562	3.19410
1452	3.1619656	1489	3.1728947	1526	3.18402	1563	3.19440
1453	3.1622656	1490	3.1731863	1527	3.18437	1564	3.19470
1454	3.1625644	1491	3.1734776	1528	3.18472	1565	3.19500
1455	3.1628630	1492	3.1737688	1529	3.18507	1566	3.19530
1456	3.1631614	1493	3.1740598	1530	3.18542	1567	3.19560
1457	3.1634595	1494	3.1743506	1531	3.18577	1568	3.19590
1458	3.1637575	1495	3.1746412	1532	3.18612	1569	3.19620
1459	3.1640553	1496	3.1749316	1533	3.18647	1570	3.19650
1460	3.1643528	1497	3.1752218	1534	3.18682	1571	3.19680
1461	3.1646502	1498	3.1755118	1535	3.18717	1572	3.19710
1462	3.1649474	1499	3.1758016	1536	3.18752	1573	3.19740
1463	3.1652443	1500	3.1760913	1537	3.18787	1574	3.19770
1464	3.1655411	1501	3.1763807	1538	3.18822	1575	3.19800
1465	3.1658376	1502	3.1766699	1539	3.18857	1576	3.19830
1466	3.1661340	1503	3.1769590	1540	3.18892	1577	3.19860
1467	3.1664301	1504	3.1772478	1541	3.18927	1578	3.19890
1468	3.1667260	1505	3.1775365	1542	3.18962	1579	3.19920
1469	3.1670218	1506	3.1778250	1543	3.18997	1580	3.19950
1470	3.1673173	1507	3.1781132	1544	3.19032	1581	3.19980
1471	3.1676127	1508	3.1784013	1545	3.19067	1582	3.20010
1472	3.1679078	1509	3.1786892	1546	3.19102	1583	3.20040
1473	3.1682027	1510	3.1789769	1547	3.19137	1584	3.20070
1474	3.1684975	1511	3.1792645	1548	3.19172	1585	3.20100
1475	3.1687920	1512	3.1795518	1549	3.19207	1586	3.20130
1476	3.1690863	1513	3.1798389	1550	3.19242	1587	3.20160
1477	3.1693805	1514	3.1801259	1551	3.19277	1588	3.20190
1478	3.1696744	1515	3.1804126	1552	3.19312	1589	3.20220
1479	3.1699682	1516	3.1806992	1553	3.19347	1590	3.20250
1480	3.1702617	1517	3.1809856	1554	3.19382	1591	3.20280

	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5	3.1917304	1592	3.2019431	1629	3.2119211
6	3.1920096	1593	3.2022158	1630	3.2121876
7	3.1922886	1594	3.2024883	1631	3.2124540
8	3.1925674	1595	3.2027607	1632	3.2127201
9	3.1928461	1596	3.2030329	1633	3.2129862
0	3.1931246	1597	3.2033049	1634	3.2132521
1	3.1934029	1598	3.2035768	1635	3.2135178
2	3.1936810	1599	3.2038485	1636	3.2137833
3	3.1939590	1600	3.2041200	1637	3.2140487
4	3.1942367	1601	3.2043913	1638	3.2143139
5	3.1945143	1602	3.2046625	1639	3.2145789
6	3.1947917	1603	3.2049335	1640	3.2148438
7	3.1950690	1604	3.2052044	1641	3.2151086
8	3.1953460	1605	3.2054750	1642	3.2153732
9	3.1956229	1606	3.2057455	1643	3.2156376
0	3.1958996	1607	3.2060159	1644	3.2159018
1	3.1961762	1608	3.2062860	1645	3.2161659
2	3.1964525	1609	3.2065560	1646	3.2164298
3	3.1967287	1610	3.2068259	1647	3.2166936
4	3.1970047	1611	3.2070955	1648	3.2169572
5	3.1972806	1612	3.2073650	1649	3.2172206
6	3.1975562	1613	3.2076344	1650	3.2174839
7	3.1978317	1614	3.2079035	1651	3.2177471
8	3.1981070	1615	3.2081725	1652	3.2180100
9	3.1983821	1616	3.2084414	1653	3.2182728
0	3.1986571	1617	3.2087100	1654	3.2185355
1	3.1989319	1618	3.2089785	1655	3.2187980
2	3.1992065	1619	3.2092468	1656	3.2190603
3	3.1994809	1620	3.2095150	1657	3.2193225
4	3.1997552	1621	3.2097830	1658	3.2195845
5	3.2000293	1622	3.2100508	1659	3.2198464
6	3.2003032	1623	3.2103185	1660	3.2201081
7	3.2005769	1624	3.2105860	1661	3.2203696
8	3.2008505	1625	3.2108534	1662	3.2206310
9	3.2011239	1626	3.2111205	1663	3.2208922
0	3.2013971	1627	3.2113876	1664	3.2211533
1	3.2016702	1628	3.2116544	1665	3.2214142

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1666	3.2216750	1703	3.2312146	1740	3.2405492
1667	3.2219356	1704	3.2314696	1741	3.2407988
1668	3.2224960	1705	3.2317244	1742	3.2410481
1669	3.2221563	1706	3.2319790	1743	3.2412971
1670	3.2227165	1707	3.2322335	1744	3.2415461
1671	3.2229764	1708	3.2324879	1745	3.2417954
1672	3.2232363	1709	3.2327421	1746	3.2420444
1673	3.2234959	1710	3.2329961	1747	3.2422932
1674	3.2237555	1711	3.2332500	1748	3.2425414
1675	3.2240148	1712	3.2335038	1749	3.2427898
1676	3.2242740	1713	3.2337574	1750	3.2430380
1677	3.2245331	1714	3.2340108	1751	3.2432861
1678	3.2247920	1715	3.2342641	1752	3.2435341
1679	3.2250507	1716	3.2345173	1753	3.2437819
1680	3.2253093	1717	3.2347703	1754	3.2440299
1681	3.2255677	1718	3.2350232	1755	3.2442771
1682	3.2258260	1719	3.2352759	1756	3.2445241
1683	3.2260841	1720	3.2355284	1757	3.2447711
1684	3.2263421	1721	3.2357809	1758	3.2450181
1685	3.2265999	1722	3.2360331	1759	3.2452651
1686	3.2268576	1723	3.2362853	1760	3.2455117
1687	3.2271151	1724	3.2365373	1761	3.2457580
1688	3.2272724	1725	3.2367891	1762	3.2460041
1689	3.2276296	1726	3.2370408	1763	3.2462501
1690	3.2278867	1727	3.2372923	1764	3.2464961
1691	3.2281436	1728	3.2375437	1765	3.2467419
1692	3.2284004	1729	3.2377950	1766	3.2469876
1693	3.2286570	1730	3.2380461	1767	3.2472331
1694	3.2289134	1731	3.2382971	1768	3.2474784
1695	3.2291697	1732	3.2385479	1769	3.2477236
1696	3.2294258	1733	3.2387986	1770	3.2479687
1697	3.2296818	1734	3.2390491	1771	3.2482137
1698	3.2299377	1735	3.2392995	1772	3.2484586
1699	3.2301934	1736	3.2395497	1773	3.2487034
1700	3.2304489	1737	3.2397998	1774	3.2489481
1701	3.2307043	1738	3.2400498	1775	3.2491927
1702	3.2309596	1739	3.2402996	1776	3.2494372

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
77	3.2496874	1814	3.2586373	1851	3.2674064
78	3.2499318	1815	3.2588766	1852	3.2676410
79	3.2501759	1816	3.2591158	1853	3.2678754
80	3.2504200	1817	3.2593549	1854	3.2681097
81	3.2506639	1818	3.2595939	1855	3.2683439
82	3.2509077	1819	3.2598327	1856	3.2685780
83	3.2511513	1820	3.2600714	1857	3.2688119
84	3.2513948	1821	3.2603099	1858	3.2690457
85	3.2516382	1822	3.2605484	1859	3.2692794
86	3.2518815	1823	3.2607867	1860	3.2695129
87	3.2521246	1824	3.2610248	1861	3.2697464
88	3.2523676	1825	3.2612629	1862	3.2699797
89	3.2526103	1826	3.2615008	1863	3.2702128
90	3.2528530	1827	3.2617385	1864	3.2704459
91	3.2530956	1828	3.2619762	1865	3.2706788
92	3.2533380	1829	3.2622137	1866	3.2709116
93	3.2535803	1830	3.2624511	1867	3.2711443
94	3.2538224	1831	3.2626883	1868	3.2713769
95	3.2540645	1832	3.2629255	1869	3.2716093
96	3.2543063	1833	3.2631625	1870	3.2718416
97	3.2545481	1834	3.2633993	1871	3.2720738
98	3.2547897	1835	3.2636361	1872	3.2723058
99	3.2550312	1836	3.2638727	1873	3.2725378
100	3.2552725	1837	3.2641092	1874	3.2727696
101	3.2555137	1838	3.2643455	1875	3.2730013
102	3.2557548	1839	3.2645817	1876	3.2732328
103	3.2559957	1840	3.2648178	1877	3.2734643
104	3.2562365	1841	3.2650538	1878	3.2736956
105	3.2564772	1842	3.2652896	1879	3.2739268
106	3.2567177	1843	3.2655253	1880	3.2741578
107	3.2569582	1844	3.2657609	1881	3.2743888
108	3.2571984	1845	3.2659964	1882	3.2746196
109	3.2574386	1846	3.2662317	1883	3.2748503
110	3.2576786	1847	3.2664669	1884	3.2750809
111	3.2579184	1848	3.2667020	1885	3.2753113
112	3.2581582	1849	3.2669369	1886	3.2755417
113	3.2583978	1850	3.2671717	1887	3.2757719

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1888	3.2760020	1925	3.2844307	1962	3.2926990
1889	3.2762320	1926	3.2846563	1963	3.2929203
1890	3.2764618	1927	3.2848817	1964	3.2931415
1891	3.2766915	1928	3.2851070	1965	3.2933626
1892	3.2769211	1929	3.2853322	1966	3.2935835
1893	3.2771506	1930	3.2855573	1967	3.2938044
1894	3.2773800	1931	3.2857823	1968	3.2940251
1895	3.2776092	1932	3.2860071	1969	3.2942457
1896	3.2778383	1933	3.2862318	1970	3.2944662
1897	3.2780673	1934	3.2864565	1971	3.2946866
1898	3.2782962	1935	3.2866810	1972	3.2949069
1899	3.2785250	1936	3.2869054	1973	3.2951271
1900	3.2787536	1937	3.2871296	1974	3.2953471
1901	3.2789821	1938	3.2873538	1975	3.2955671
1902	3.2792105	1939	3.2875778	1976	3.2957869
1903	3.2794388	1940	3.2878017	1977	3.2960067
1904	3.2796669	1941	3.2880255	1978	3.2962263
1905	3.2798950	1942	3.2882492	1979	3.2964458
1906	3.2801229	1943	3.2884728	1980	3.2966652
1907	3.2803507	1944	3.2886963	1981	3.2968845
1908	3.2805784	1945	3.2889196	1982	3.2971036
1909	3.2808059	1946	3.2891428	1983	3.2973227
1910	3.2810334	1947	3.2893659	1984	3.2975417
1911	3.2812607	1948	3.2895889	1985	3.2977604
1912	3.2814879	1949	3.2898118	1986	3.2979792
1913	3.2817150	1950	3.2900346	1987	3.2981979
1914	3.2819419	1951	3.2902573	1988	3.2984164
1915	3.2821688	1952	3.2904798	1989	3.2986348
1916	3.2823955	1953	3.2907022	1990	3.2988531
1917	3.2826221	1954	3.2909246	1991	3.2990713
1918	3.2828486	1955	3.2911468	1992	3.2992895
1919	3.2830750	1956	3.2913688	1993	3.2995073
1920	3.2833012	1957	3.2915908	1994	3.2997251
1921	3.2835274	1958	3.2918127	1995	3.2999429
1922	3.2837534	1959	3.2920344	1996	3.3001605
1923	3.2839793	1960	3.2922561	1997	3.3003781
1924	3.2842051	1961	3.2924776	1998	3.3005955

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
1999	3.3008128	2036	3.3087778	2073	3.3165993
2000	3.3010300	2037	3.3089910	2074	3.3168087
2001	3.3012471	2038	3.3092042	2075	3.3170181
2002	3.3014641	2039	3.3094172	2076	3.3172273
2003	3.3016809	2040	3.3096302	2077	3.3174365
2004	3.3018977	2041	3.3098430	2078	3.3176455
2005	3.3021144	2042	3.3100557	2079	3.3178545
2006	3.3023309	2043	3.3102684	2080	3.3180633
2007	3.3025474	2044	3.3104809	2081	3.3182721
2008	3.3027637	2045	3.3106933	2082	3.3184807
2009	3.3029799	2046	3.3109056	2083	3.3186893
2010	3.3031961	2047	3.3111178	2084	3.3188977
2011	3.3034121	2048	3.3113299	2085	3.3191061
2012	3.3036280	2049	3.3115420	2086	3.3193143
2013	3.3038438	2050	3.3117539	2087	3.3195224
2014	3.3040585	2051	3.3119657	2088	3.3197305
2015	3.3042751	2052	3.3121774	2089	3.3199384
2016	3.3044905	2053	3.3123889	2090	3.3201463
2017	3.3047059	2054	3.3126004	2091	3.3203540
2018	3.3049212	2055	3.3128118	2092	3.3205617
2019	3.3051363	2056	3.3130231	2093	3.3207692
2020	3.3053514	2057	3.3132343	2094	3.3209767
2021	3.3055663	2058	3.3134454	2095	3.3211840
2022	3.3057812	2059	3.3136563	2096	3.3213913
2023	3.3059959	2060	3.3138672	2097	3.3215984
2024	3.3062105	2061	3.3140780	2098	3.3218055
2025	3.3064250	2062	3.3142887	2099	3.3220124
2026	3.3066394	2063	3.3144992	2100	3.3222193
2027	3.3068537	2064	3.3147097	2101	3.3224260
2028	3.3070679	2065	3.3149200	2102	3.3226327
2029	3.3072820	2066	3.3151303	2103	3.3228393
2030	3.3074960	2067	3.3153405	2104	3.3230457
2031	3.3077099	2068	3.3155505	2105	3.3232521
2032	3.3079237	2069	3.3157605	2106	3.3234584
2033	3.3081374	2070	3.3159703	2107	3.3236645
2034	3.3083509	2071	3.3161801	2108	3.3238706
2035	3.3085644	2072	3.3163897	2109	3.3240766

Num. Logarithm.	Num. Logarithm.	Num. Logarithm.
2110 3.3242828	2147 3.3318320	2184 3.3392516
2111 3.3244882	2148 3.3320343	2185 3.3394514
2112 3.3246939	2149 3.3322364	2186 3.3396501
2113 3.3248995	2150 3.3324385	2187 3.3398488
2114 3.3251050	2151 3.3326404	2188 3.3400473
2115 3.3253104	2152 3.3328423	2189 3.3402458
2116 3.3255157	2153 3.3330440	2190 3.3404441
2117 3.3257205	2154 3.3332457	2191 3.3406424
2118 3.3259260	2155 3.3334473	2192 3.3408405
2119 3.3261310	2156 3.3336488	2193 3.3410386
2120 3.3263359	2157 3.3338501	2194 3.3412366
2121 3.3265407	2158 3.3340514	2195 3.3414345
2122 3.3267454	2159 3.3342526	2196 3.3416323
2123 3.3269500	2160 3.3344537	2197 3.3418305
2124 3.3271545	2161 3.3346548	2198 3.3420277
2125 3.3273589	2162 3.3348557	2199 3.3422252
2126 3.3275633	2163 3.3350565	2200 3.3424227
2127 3.3277675	2164 3.3352572	2201 3.3426200
2128 3.3279716	2165 3.3354579	2202 3.3428173
2129 3.3281757	2166 3.3356585	2203 3.3430145
2130 3.3283796	2167 3.3358589	2204 3.3432116
2131 3.3285834	2168 3.3360593	2205 3.3434086
2132 3.3287872	2169 3.3362596	2206 3.3436055
2133 3.3289909	2170 3.3364597	2207 3.3438023
2134 3.3291944	2171 3.3366598	2208 3.3439991
2135 3.3293979	2172 3.3368598	2209 3.3441957
2136 3.3296012	2173 3.3370597	2210 3.3443923
2137 3.3298045	2174 3.3372595	2211 3.3445887
2138 3.3300077	2175 3.3374593	2212 3.3447851
2139 3.3302108	2176 3.3376589	2213 3.3449814
2140 3.3304138	2177 3.3378584	2214 3.3451776
2141 3.3306167	2178 3.3380579	2215 3.3453737
2142 3.3308195	2179 3.3382572	2216 3.3455698
2143 3.3310222	2180 3.3384565	2217 3.3457657
2144 3.3312248	2181 3.3386557	2218 3.3459615
2145 3.3314273	2182 3.3388547	2219 3.3461573
2146 3.3316297	2183 3.3390537	2220 3.3463530

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2221	3.3465486	2258	3.3537239	2295	3.3607827
2222	3.3467441	2259	3.3539162	2296	3.3609719
2223	3.3469395	2260	3.3541084	2297	3.3611610
2224	3.3471348	2261	3.3543005	2298	3.3613500
2225	3.3473300	2262	3.3544926	2299	3.3615390
2226	3.3475252	2263	3.3546845	2300	3.3617278
2227	3.3477202	2264	3.3548764	2301	3.3619166
2228	3.3479152	2265	3.3550682	2302	3.3621053
2229	3.3481101	2266	3.3552599	2303	3.3622939
2230	3.3483049	2267	3.3554515	2304	3.3624825
2231	3.3484996	2268	3.3556430	2305	3.3626709
2232	3.3486942	2269	3.3558345	2306	3.3628593
2233	3.3488887	2270	3.3560259	2307	3.3630476
2234	3.3490832	2271	3.3562171	2308	3.3632358
2235	3.3492775	2272	3.3564083	2309	3.3634239
2236	3.3494718	2273	3.3565994	2310	3.3636120
2237	3.3496660	2274	3.3567905	2311	3.3637999
2238	3.3498601	2275	3.3569814	2312	3.3639878
2239	3.3500541	2276	3.3571723	2313	3.3641756
2240	3.3502480	2277	3.3573630	2314	3.3643633
2241	3.3504419	2278	3.3575537	2315	3.3645510
2242	3.3506356	2279	3.3577443	2316	3.3647386
2243	3.3508293	2280	3.3579384	2317	3.3649260
2244	3.3510228	2281	3.3581253	2318	3.3651134
2245	3.3512163	2282	3.3583156	2319	3.3653007
2246	3.3514098	2283	3.3585059	2320	3.3654880
2247	3.3516031	2284	3.3586961	2321	3.3656751
2248	3.3517963	2285	3.3588862	2322	3.3658622
2249	3.3519895	2286	3.3590762	2323	3.3660492
2250	3.3521825	2287	3.3592662	2324	3.3662361
2251	3.3523755	2288	3.3594560	2325	3.3664230
2252	3.3525684	2289	3.3596458	2326	3.3666097
2253	3.3527612	2290	3.3598355	2327	3.3667964
2254	3.3529539	2291	3.3600251	2328	3.3669830
2255	3.3531465	2292	3.3602146	2329	3.3671695
2256	3.3533391	2293	3.3604041	2330	3.3673559
2257	3.3535316	2294	3.3605934	2331	3.3675423

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2332	3.3677285	2369	3.3745651	2406	3.3812956
2333	3.3679147	2370	3.3747483	2407	3.3814761
2334	3.3681008	2371	3.3749316	2408	3.3816565
2335	3.3682869	2372	3.3751147	2409	3.3818368
2336	3.3684728	2373	3.3752977	2410	3.3820170
2337	3.3686587	2374	3.3754807	2411	3.3821972
2338	3.3688445	2375	3.3756636	2412	3.3823773
2339	3.3690302	2376	3.3758464	2413	3.3825573
2340	3.3692159	2377	3.3760292	2414	3.3827373
2341	3.3694014	2378	3.3762118	2415	3.3829171
2342	3.3695869	2379	3.3763944	2416	3.3830969
2343	3.3697723	2380	3.3765769	2417	3.3832766
2344	3.3699576	2381	3.3767594	2418	3.3834563
2345	3.3701428	2382	3.3769418	2419	3.3836359
2346	3.3703280	2383	3.3771240	2420	3.3838154
2347	3.3705131	2384	3.3773062	2421	3.3839948
2348	3.3706981	2385	3.3774884	2422	3.3841741
2349	3.3708830	2386	3.3776704	2423	3.3843534
2350	3.3710679	2387	3.3778524	2424	3.3845326
2351	3.3712526	2388	3.3780343	2425	3.3847117
2352	3.3714373	2389	3.3782161	2426	3.3848908
2353	3.3716219	2390	3.3783979	2427	3.3850698
2354	3.3718065	2391	3.3785796	2428	3.3852487
2355	3.3719909	2392	3.3787612	2429	3.3854275
2356	3.3721753	2393	3.3789427	2430	3.3856063
2357	3.3723596	2394	3.3791241	2431	3.3857850
2358	3.3725438	2395	3.3793055	2432	3.3859636
2359	3.3727279	2396	3.3794868	2433	3.3861421
2360	3.3729120	2397	3.3796680	2434	3.3863205
2361	3.3730960	2398	3.3798492	2435	3.3864990
2362	3.3732799	2399	3.3800302	2436	3.3866773
2363	3.3734637	2400	3.3802112	2437	3.3868555
2364	3.3736475	2401	3.3803922	2438	3.3870337
2365	3.3738311	2402	3.3805730	2439	3.3872118
2366	3.3740147	2403	3.3807538	2440	3.3873898
2367	3.3741983	2404	3.3809345	2441	3.3875678
2368	3.3743817	2405	3.3811151	2442	3.3877457

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2443	3.3879235	2480	3.3944517	2517	3.4008832
2444	3.3881012	2481	3.3946268	2518	3.4010557
2445	3.3882789	2482	3.3948018	2519	3.4012282
2446	3.3884565	2483	3.3949767	2520	3.4014005
2447	3.3886340	2484	3.3951516	2521	3.4015728
2448	3.3888114	2485	3.3953264	2522	3.4017451
2449	3.3889888	2486	3.3955011	2523	3.4019173
2450	3.3891661	2487	3.3956758	2524	3.4020893
2451	3.3893433	2488	3.3958504	2525	3.4022614
2452	3.3895205	2489	3.3960249	2526	3.4024333
2453	3.3896975	2490	3.3961993	2527	3.4026052
2454	3.3898746	2491	3.3963737	2528	3.4027771
2455	3.3900515	2492	3.3965489	2529	3.4029488
2456	3.3902284	2493	3.3967223	2530	3.4031205
2457	3.3904052	2494	3.3968964	2531	3.4032921
2458	3.3905819	2495	3.3970705	2532	3.4034637
2458	3.3907585	2496	3.3972446	2533	3.4036352
2460	3.3909351	2497	3.3974185	2534	3.4038066
2461	3.3911116	2498	3.3975924	2535	3.4039780
2462	3.3912880	2499	3.3977662	2536	3.4041492
2493	3.3914644	2500	3.3979400	2537	3.4043205
2464	3.3916407	2501	3.3981137	2538	3.4044916
2465	3.3918169	2502	3.3982873	2539	3.4046627
2466	3.3919931	2503	3.3984608	2540	3.4048337
2467	3.3921691	2404	3.3986343	2541	3.4050047
2468	3.3923452	2505	3.3988077	2542	3.4051755
2469	3.3925211	2506	3.3989811	2543	3.4053464
2470	3.3926969	2507	3.3991543	2544	3.4055171
2471	3.3928727	2508	3.3993275	2545	3.4056878
2472	3.3930485	2509	3.3995007	2546	3.4058584
2473	3.3932241	2510	3.3996737	2547	3.4060289
2474	3.3933997	2511	3.3998467	2548	3.4061994
2475	3.3935752	2512	3.4000196	2549	3.4063698
2476	3.3937506	2513	3.4001925	2550	3.4065402
2477	3.3939260	2514	3.4003653	2551	3.4067105
2478	3.3941013	2515	3.4005380	2552	3.4068807
2479	3.3942765	2516	3.4007106	2553	3.4070508

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2554	3.4072209	2591	3.4134674	2628	3.4196254
2555	3.4073909	2592	3.4136350	2629	3.4197905
2556	3.4075608	2593	3.4138025	2630	3.4199557
2557	3.4077307	2594	3.4139700	2631	3.4201208
2558	3.4079005	2595	3.4141374	2632	3.4202859
2559	3.4080703	2596	3.4143047	2633	3.4204509
2560	3.4082400	2597	3.4144719	2634	3.4206158
2561	3.4084096	2598	3.4146391	2635	3.4207806
2562	3.4085791	2599	3.4148063	2636	3.4209454
2563	3.4087486	2600	3.4149733	2637	3.4211101
2564	3.4089180	2601	3.4151404	2638	3.4212748
2565	3.4090874	2602	3.4153073	2639	3.4214394
2566	3.4092567	2603	3.4154742	2640	3.4216039
2567	3.4094259	2604	3.4156410	2641	3.4217684
2568	3.4095950	2605	3.4158077	2642	3.4219328
2569	3.4097641	2606	3.4159744	2643	3.4220972
2570	3.4099331	2607	3.4161410	2644	3.4222614
2571	3.4101021	2608	3.4163076	2645	3.4224257
2572	3.4102710	2609	3.4164741	2646	3.4225898
2573	3.4104398	2610	3.4166405	2647	3.4227537
2574	3.4106085	2611	3.4168069	2648	3.4229180
2575	3.4107772	2612	3.4169732	2649	3.4230820
2576	3.4109459	2613	3.4171394	2650	3.4232459
2577	3.4111144	2614	3.4173056	2651	3.4234097
2578	3.4112829	2615	3.4174717	2652	3.4235735
2579	3.4114513	2616	3.4176377	2653	3.4237372
2580	3.4116197	2617	3.4178037	2654	3.4239009
2581	3.4117880	2618	3.4179696	2655	3.4240645
2582	3.4119562	2619	3.4181356	2656	3.4242281
2583	3.4121244	2620	3.4183013	2657	3.4243916
2584	3.4122925	2621	3.4184670	2658	3.4245550
2585	3.4124605	2622	3.4186327	2659	3.4247183
2586	3.4126285	2623	3.4187983	2660	3.4248816
2587	3.4127964	2624	3.4189638	2661	3.4250449
2588	3.4129643	2625	3.4191293	2662	3.4252080
2589	3.4131320	2626	3.4192947	2663	3.4253712
2590	3.4132998	2527	3.4194601	2664	3.4255342

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2665	3.4256972	2702	3.4316853	2739	3.4375920
2666	3.4258601	2703	3.4318460	2740	3.4377506
2667	3.4260230	2704	3.4320067	2741	3.4379090
2668	3.4261858	2705	3.4321673	2742	3.4380674
2669	3.4263486	2706	3.4323278	2743	3.4382258
2670	3.4265113	2707	3.4324882	2744	3.4383841
2671	3.4266739	2708	3.4326487	2745	3.4385423
2672	3.4268365	2709	3.4328090	2746	3.4387005
2673	3.4269990	2710	3.4329693	2747	3.4388587
2674	3.4271614	2711	3.4331295	2748	3.4399167
2675	3.4273238	2712	3.4332897	2749	3.4391747
2676	3.4274861	2713	3.4334498	2750	3.4393327
2677	3.4276484	2714	3.4336098	2751	3.4394906
2678	3.4278106	2715	3.4337698	2752	3.4396484
2679	3.4279727	2716	3.4339298	2753	3.4398062
2680	3.4281348	2717	3.4340896	2754	3.4399639
2681	3.4282968	2718	3.4342494	2755	3.4401216
2682	3.4284588	2719	3.4344092	2756	3.4402692
2683	3.4286207	2720	3.4345689	2757	3.4404368
2684	3.4287825	2721	3.4347285	2758	3.4405943
2685	3.4289443	2722	3.4348881	2759	3.4407517
2686	3.4291060	2723	3.4350476	2760	3.4409091
2687	3.4292677	2724	3.4352071	2761	3.4410664
2688	3.4294293	2725	3.4353665	2762	3.4412237
2689	3.4295908	2726	3.4355258	2763	3.4413809
2690	3.4297523	2727	3.4356851	2764	3.4415380
2691	3.4299137	2728	3.4358444	2765	3.4416951
2692	3.4300751	2729	3.4360035	2766	3.4418522
2693	3.4302364	2730	3.4361626	2767	3.4420092
2694	3.4303976	2731	3.4363217	2768	3.4421661
2695	3.4305588	2732	3.4364807	2769	3.4423229
2696	3.4307199	2733	3.4366396	2770	3.4424798
2697	3.4308809	2734	3.4367985	2771	3.4426365
2698	3.4310419	2735	3.4369573	2772	3.4427932
2699	3.4312029	2736	3.4271161	2773	3.4429499
2700	3.4313638	2737	3.4372748	2774	3.4431065
2701	3.4315246	2738	3.4374334	2775	3.4432630

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2776	3.4434195	2813	3.4491597	2850	3.4548449
2777	3.4435759	2814	3.4493241	2851	3.4549772
2778	3.4437322	2815	3.4494784	2852	3.4551495
2779	3.4438885	2816	3.4496326	2853	3.4553016
2780	3.4440448	2817	3.4497858	2854	3.4554540
2781	3.4442010	2818	3.4499410	2855	3.4556061
2782	3.4443571	2819	3.4500951	2856	3.4557582
2783	3.4445132	2820	3.4502491	2857	3.4559102
2784	3.4446692	2821	3.4504031	2858	3.4560622
2785	3.4448252	2822	3.4505570	2859	3.4562142
2786	3.4449311	2823	3.4507109	2860	3.4563660
2787	3.4451370	2824	3.4508647	2861	3.4565179
2788	3.4452928	2825	3.4510184	2862	3.4566695
2789	3.4454485	2826	3.4511721	2863	3.4568213
2790	3.4456042	2827	3.4513258	2864	3.4569730
2791	3.4457598	2828	3.4514794	2865	3.4571246
2792	3.4459154	2829	3.4516329	2866	3.4572762
2793	3.4460709	2830	3.4517864	2867	3.4574277
2794	3.4462264	2831	3.4519390	2868	3.4575791
2795	3.4463818	2832	3.4520932	2869	3.4577305
2796	3.4465372	2833	3.4522466	2870	3.4578819
2797	3.4466925	2834	3.4523998	2871	3.4580332
2798	3.4468477	2835	3.4525531	2872	3.4581844
2799	3.4470029	2836	3.4527062	2873	3.4583356
2700	3.4471580	2837	3.4528593	2874	3.4584867
2701	3.4473131	2838	3.4530124	2875	3.4586378
2702	3.4474681	2839	3.4531654	2876	3.4587889
2703	3.4476231	2840	3.4533183	2877	3.4589399
2704	3.4477780	2841	3.4534712	2878	3.4590908
2705	3.4479329	2842	3.4536247	2879	3.4592417
2706	3.4480877	2843	3.4537769	2880	3.4593925
2707	3.4482424	2844	3.4539296	2881	3.4595433
2708	3.4483971	2845	3.4540823	2882	3.4596940
2709	3.4485517	2846	3.4542349	2883	3.4598446
2710	3.4487063	2847	3.4543875	2884	3.4599953
2711	3.4488608	2848	3.4545400	2885	3.4601458
2712	3.4490153	2849	3.4546924	2886	3.4602963

m. Logarithm.	Num.	Logarithm.	Num.	Logarithm.
87 3.4604468	2924 3.4659774	2961 3.4714384		
88 3.4605972	2925 3.4661259	2962 3.4715851		
89 3.4607475	2926 3.4662743	2963 3.4717317		
90 3.4608978	2927 3.4664227	2964 3.4718782		
91 3.4610481	2928 3.4665711	2965 3.4720247		
92 3.4611983	2929 3.4667194	2966 3.4721711		
93 3.4613484	2930 3.4668676	2967 3.4723175		
94 3.4614985	2931 3.4670158	2968 3.4724639		
95 3.4616486	2932 3.4671640	2969 3.4726102		
96 3.4617986	2933 3.4673121	2970 3.4727564		
97 3.4619485	2934 3.4674601	2971 3.4729027		
98 3.4620984	2935 3.4676081	2972 3.4730488		
99 3.4622482	2936 3.4677560	2973 3.4731949		
00 3.4623980	2937 3.4679039	2974 3.4733410		
01 3.4625477	2938 3.4680518	2975 3.4734870		
02 3.4626974	2939 3.4681996	2976 3.4736329		
03 3.4628470	2940 3.4683473	2977 3.4737788		
04 3.4629966	2941 3.4684950	2978 3.4739247		
05 3.4631461	2942 3.4686427	2979 3.4740705		
06 3.4632956	2943 3.4687903	2980 3.4742163		
07 3.4634450	2944 3.4689378	2981 3.4743620		
08 3.4635944	2945 3.4690853	2982 3.4745076		
09 3.4637437	2946 3.4692327	2983 3.4746533		
10 3.4638930	2947 3.4693801	2984 3.4747988		
11 3.4640422	2948 3.4695275	2985 3.4749443		
12 3.4641914	2949 3.4696748	2986 3.4750898		
13 3.4643405	2950 3.4698220	2987 3.4752352		
14 3.4644895	2951 3.4699692	2988 3.4753806		
15 3.4646386	2952 3.4701163	2989 3.4755259		
16 3.4647875	2953 3.4702634	2990 3.4756712		
17 3.4649364	2954 3.4704105	2991 3.4758164		
18 3.4650853	2955 3.4705575	2992 3.4759616		
19 3.4652341	2956 3.4707044	2993 3.4761067		
20 3.4653828	2957 3.4708513	2994 3.4762518		
21 3.4655316	2958 3.4709982	2995 3.4763968		
22 3.4656802	2959 3.4711450	2996 3.4765418		
23 3.4658288	2960 3.4712917	2997 3.4766867		

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
2997	3.4766867	3034	3.4820156	3071	3.4872790
2998	3.4768316	3035	3.4821587	3072	3.4874212
2999	3.4769765	3036	3.4823018	3073	3.4875626
3000	3.4771212	3037	3.4824448	3074	3.4877039
3001	3.4772660	3038	3.4825878	3075	3.4878452
3002	3.4774107	3039	3.4827307	3076	3.4879865
3003	3.4775553	3040	3.4828736	3077	3.4881278
3004	3.4776999	3041	3.4830164	3078	3.4882691
3005	3.4778445	3042	3.4831592	3079	3.4884104
3006	3.4779890	3043	3.4833019	3080	3.4885517
3007	3.4781334	3044	3.4834446	3081	3.4886930
3008	3.4782778	3045	3.4835873	3082	3.4888343
3009	3.4784222	3046	3.4837299	3083	3.4889756
3010	3.4785665	3047	3.4838725	3084	3.4891169
3011	3.4787108	3048	3.4840150	3085	3.4892582
3012	3.4788550	3049	3.4841574	3086	3.4893995
3013	3.4789991	3050	3.4842998	3087	3.4895408
3014	3.4791432	3051	3.4844422	3088	3.4896821
3015	3.4792873	3052	3.4845845	3089	3.4898234
3016	3.4794313	3053	3.4847268	3090	3.4899647
3017	3.4795753	3054	3.4848690	3091	3.4901060
3018	3.4797192	3055	3.4850112	3092	3.4902473
3019	3.4798631	3056	3.4851533	3093	3.4903886
3020	3.4800069	3057	3.4852954	3094	3.4905299
3021	3.4801507	3058	3.4854375	3095	3.4906712
3022	3.4802945	3059	3.4855795	3096	3.4908125
3023	3.4804381	3060	3.4857214	3097	3.4909538
3024	3.4805818	3061	3.4858633	3098	3.4910951
3025	3.4807254	3062	3.4860052	3099	3.4912364
3026	3.4808689	3063	3.4861470	3100	3.4913777
3027	3.4810124	3064	3.4862888	3101	3.4915190
3028	3.4811559	3065	3.4864305	3102	3.4916603
3029	3.4812993	3066	3.4865721	3103	3.4918016
3030	3.4814426	3067	3.4867138	3104	3.4919429
3031	3.4815859	3068	3.4868554	3105	3.4920842
3032	3.4817292	3069	3.4869969	3106	3.4922255
3033	3.4818724	3070	3.4871384	3107	3.4923668

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
108	3.4924810	3145	3.4976206	3182	3.5027602
109	3.4926207	3146	3.4977587	3183	3.5028366
110	3.4927604	3147	3.4978967	3184	3.5029731
111	3.4929000	3148	3.4980347	3185	3.5031094
112	3.4930396	3149	3.4981727	3186	3.5032458
113	3.4931791	3150	3.4983106	3187	3.5033821
114	3.4933186	3151	3.4984484	3188	3.5035183
115	3.4934580	3152	3.4985862	3189	3.5036545
116	3.4935974	3153	3.4987240	3190	3.5037907
117	3.4937368	3154	3.4988617	3191	3.5039268
118	3.4938761	3155	3.4989994	3192	3.5040629
119	3.4940154	3156	3.4991370	3193	3.5041989
120	3.4941546	3157	3.4992746	3194	3.5043349
121	3.4942938	3158	3.4994121	3195	3.5044709
122	3.4944329	3159	3.4995496	3196	3.5046068
123	3.4945720	3160	3.4996871	3197	3.5047426
124	3.4947110	3161	3.4998245	3198	3.5048785
125	3.4948500	3162	3.4999619	3199	3.5050142
126	3.4949890	3163	3.5000992	3200	3.5051560
127	3.4951279	3164	3.5002365	3201	3.5052857
128	3.4952667	3165	3.5003737	3202	3.5054213
129	3.4954056	3166	3.5005109	3203	3.5055569
130	3.4955443	3167	3.5006481	3204	3.5056925
131	3.4956831	3168	3.5007851	3205	3.5058280
132	3.4958218	3169	3.5009222	3206	3.5059635
133	3.4959604	3170	3.5010593	3207	3.5060990
134	3.4960990	3171	3.5011962	3208	3.5062344
135	3.4962375	3172	3.5013332	3209	3.5063697
136	3.4963761	3173	3.5014701	3210	3.5065050
137	3.4965145	3174	3.5016069	3211	3.5066403
138	3.4966529	3175	3.5017437	3212	3.5067755
139	3.4967913	3176	3.5018805	3213	3.5069107
140	3.4969296	3177	3.5020172	3214	3.5070459
141	3.4970679	3178	3.5021539	3215	3.5071810
142	3.4972062	3179	3.5022902	3216	3.5073160
143	3.4973444	3180	3.5024271	3217	3.5074511
144	3.4974825	3181	3.5025637	3218	3.5075860

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3219	3.5077210	3256	3.5126844	3293	3.5175917	3330	3.5224580
3220	3.5078559	3257	3.5128178	3294	3.5177248	3331	3.5225911
3221	3.5079907	3258	3.5129511	3295	3.5178579	3332	3.5227242
3222	3.5081255	3259	3.5130844	3296	3.5179910	3333	3.5228573
3223	3.5082603	3260	3.5132176	3297	3.5181241	3334	3.5229904
3224	3.5083950	3261	3.5133508	3298	3.5182572	3335	3.5231235
3225	3.5085297	3262	3.5134840	3299	3.5183903	3336	3.5232566
3226	3.5086644	3263	3.5136171	3300	3.5185234	3337	3.5233897
3227	3.5087990	3264	3.5137501	3301	3.5186565	3338	3.5235228
3228	3.5089335	3265	3.5138832	3302	3.5187896	3339	3.5236559
3229	3.5090680	3266	3.5140162	3303	3.5189227	3340	3.5237890
3230	3.5092025	3267	3.5141491	3304	3.5190558	3341	3.5239221
3231	3.5093370	3268	3.5142820	3305	3.5191889	3342	3.5240552
3232	3.5094713	3269	3.5144149	3306	3.5193220	3343	3.5241883
3233	3.5096057	3270	3.5145478	3307	3.5194551	3344	3.5243214
3234	3.5097400	3271	3.5146805	3308	3.5195882	3345	3.5244545
3235	3.5098743	3272	3.5148133	3309	3.5197213	3346	3.5245876
3236	3.5100085	3273	3.5149460	3310	3.5198544	3347	3.5247207
3237	3.5101427	3274	3.5150787	3311	3.5199875	3348	3.5248538
3238	3.5102768	3275	3.5152113	3312	3.5201206	3349	3.5249869
3239	3.5104109	3276	3.5153439	3313	3.5202537	3350	3.5251200
3240	3.5105450	3277	3.5154764	3314	3.5203868	3351	3.5252531
3241	3.5106790	3278	3.5156089	3315	3.5205199	3352	3.5253862
3242	3.5108130	3279	3.5257414	3316	3.5206530	3353	3.5255193
3243	3.5109469	3280	3.5158738	3317	3.5207861	3354	3.5256524
3244	3.5110808	3281	3.5160062	3318	3.5209192	3355	3.5257855
3245	3.5112147	3282	3.5161386	3319	3.5210523	3356	3.5259186
3246	3.5113485	3283	3.5162709	3320	3.5211854	3357	3.5260517
3247	3.5114823	3284	3.5164031	3321	3.5213185	3358	3.5261848
3248	3.5116160	3285	3.5165354	3322	3.5214516	3359	3.5263179
3249	3.5117497	3286	3.5166676	3323	3.5215847	3360	3.5264510
3250	3.5118834	3287	3.5167997	3324	3.5217178	3361	3.5265841
3251	3.5120170	3288	3.5169318	3325	3.5218509	3362	3.5267172
3252	3.5121505	3289	3.5170639	3326	3.5219840	3363	3.5268503
3253	3.5122841	3290	3.5171959	3327	3.5221171	3364	3.5269834
3254	3.5124175	3291	3.5173279	3328	3.5222502	3365	3.5271165
3255	3.5125510	3292	3.5174598	3329	3.5223833	3366	3.5272496

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3330	3.5224442	3357	3.5272431	3404	3.5319895
3331	3.5225746	3368	3.5273721	3405	3.5321171
3332	3.5227050	3369	3.5275010	3406	3.5322446
3333	3.5228353	3370	3.5276299	3407	3.5323721
3334	3.5229656	3371	3.5277588	3408	3.5324996
3335	3.5230958	3372	3.5278876	3409	3.5326270
3336	3.5232260	3373	3.5280163	3410	3.5327544
3337	3.5233562	3374	3.5281451	3411	3.5328817
3338	3.5234863	3375	3.5282738	3412	3.5330090
3339	3.5236164	3376	3.5284024	3413	3.5331363
3340	3.5237465	3377	3.5285311	3414	3.5332635
3341	3.5238765	3378	3.5286596	3415	3.5333907
3342	3.5240064	3379	3.5287882	3416	3.5335179
3343	3.5241364	3380	3.5289167	3417	3.5336450
3344	3.5242663	3381	3.5290452	3418	3.5337721
3345	3.5243961	3382	3.5291736	3419	3.5338991
3346	3.5245259	3383	3.5293020	3420	3.5340261
3347	3.5246557	3384	3.5294303	3421	3.5341531
3348	3.5247854	3385	3.5295587	3422	3.5342800
3349	3.5249151	3386	3.5296869	3423	3.5344069
3350	3.5250448	3387	3.5298152	3424	3.5345338
3351	3.5251744	3388	3.5299434	3425	3.5346606
3352	3.5253040	3389	3.5300716	3426	3.5347874
3353	3.5254335	3390	3.5301997	3427	3.5349141
3354	3.5255631	3391	3.5303278	3428	3.5350408
3355	3.5256925	3392	3.5304558	3429	3.5351675
3356	3.5258219	3393	3.5305839	3430	3.5352941
3357	3.5259513	3394	3.5307118	3431	3.5354207
3358	3.5260807	3395	3.5308398	3432	3.5355473
3359	3.5262100	3396	3.5309677	3433	3.5356738
3360	3.5263393	3397	3.5310955	3434	3.5358003
3361	3.5264685	3398	3.5312234	3435	3.5359267
3362	3.5265977	3399	3.5313512	3436	3.5360532
3363	3.5267269	3400	3.5314789	3437	3.5361795
3364	3.5268560	3401	3.5316066	3438	3.5363059
3365	3.5269851	3402	3.5317343	3439	3.5364322
3366	3.5271141	3403	3.5318619	3440	3.5365584

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3441	3.5366847	3478	3.5413296	3515	3.5459297
3442	3.5368109	3479	3.5414544	3516	3.5460480
3443	3.5369370	3480	3.5415792	3517	3.5461710
3444	3.5370631	3481	3.5417040	3518	3.5462950
3445	3.5371892	3482	3.5418288	3519	3.5464190
3446	3.5373153	3483	3.5419435	3520	3.5465420
3447	3.5374413	3484	3.5420781	3521	3.5466660
3448	3.5375672	3485	3.5422028	3522	3.5467890
3449	3.5376932	3486	3.5423274	3523	3.5469130
3450	3.5378191	3487	3.5424519	3524	3.5470370
3451	3.5379450	3488	3.5425765	3525	3.5471610
3452	3.5380708	3489	3.5427010	3526	3.5472850
3453	3.5381966	3490	3.5428254	3527	3.5474090
3454	3.5383223	3491	3.5429498	3528	3.5475330
3455	3.5384481	3492	3.5430742	3529	3.5476570
3456	3.5385737	3493	3.5431986	3530	3.5477810
3457	3.5386994	3494	3.5433229	3531	3.5479050
3458	3.5388250	3495	3.5434472	3532	3.5480290
3459	3.5389506	3496	3.5435714	3533	3.5481530
3460	3.5390761	3497	3.5436956	3534	3.5482770
3461	3.5392016	3498	3.5438198	3535	3.5484010
3462	3.5393271	3499	3.5439439	3536	3.5485250
3463	3.5394525	3500	3.5440680	3537	3.5486490
3464	3.5395779	3501	3.5441921	3538	3.5487730
3465	3.5397032	3502	3.5443161	3539	3.5488970
3466	3.5398286	3503	3.5444401	3540	3.5490210
3467	3.5399538	3504	3.5445641	3541	3.5491450
3468	3.5400791	3505	3.5446880	3542	3.5492690
3469	3.5402043	3506	3.5448119	3543	3.5493930
3470	3.5403295	3507	3.5449358	3544	3.5495170
3471	3.5404546	3508	3.5450596	3545	3.5496410
3472	3.5405797	3509	3.5451834	3546	3.5497650
3473	3.5407048	3510	3.5453071	3547	3.5498890
3474	3.5408298	3511	3.5454308	3548	3.5499990
3475	3.5409548	3512	3.5455545	3549	3.5501190
3476	3.5410798	3513	3.5456781	3550	3.5502390
3477	3.5412047	3514	3.5458018	3551	3.5503590

Num. Logarithm.	Num. Logarithm.	Num. Logarithm.
552 3.5504730	3589 3.5549735	3626 3.5594278
553 3.5505952	3590 3.5550944	3627 3.5595476
554 3.5507174	3591 3.5552154	3628 3.5596673
555 3.5508396	3592 3.5553363	3629 3.5597870
556 3.5509618	3593 3.5554572	3630 3.5599066
557 3.5510839	3594 3.5555781	3631 3.5600262
558 3.5512059	3595 3.5556989	3632 3.5601458
559 3.5513280	3596 3.5558197	3633 3.5602654
560 3.5514500	3597 3.5559404	3634 3.5603849
561 3.5515720	3598 3.5560612	3635 3.5605044
562 3.5516935	3599 3.5561818	3636 3.5606239
563 3.5518158	3600 3.5563025	3637 3.5607433
564 3.5519377	3601 3.5564231	3638 3.5608627
565 3.5520595	3602 3.5565437	3639 3.5609820
566 3.5521813	3603 3.5566643	3640 3.5611014
567 3.5523031	3604 3.5567848	3641 3.5612207
568 3.5524248	3605 3.5569053	3642 3.5613399
569 3.5525465	3606 3.5570257	3643 3.5614592
570 3.5526682	3607 3.5571461	3644 3.5615784
571 3.5527898	3608 3.5572665	3645 3.5616975
572 3.5529114	3609 3.5573869	3646 3.5618167
573 3.5530330	3610 3.5575072	3647 3.5619358
574 3.5531545	3611 3.5576275	3648 3.5620548
575 3.5532760	3612 3.5577477	3649 3.5621739
576 3.5533975	3613 3.5578680	3650 3.5622929
577 3.5535189	3614 3.5579881	3651 3.5624118
578 3.5536403	3615 3.5581083	3652 3.5625308
579 3.5537616	3616 3.5582284	3653 3.5626497
580 3.5538830	3617 3.5583485	3654 3.5627685
581 3.5540043	3618 3.5584686	3655 3.5628874
582 3.5541256	3619 3.5585886	3656 3.5630062
583 3.5542468	3620 3.5587086	3657 3.5631250
584 3.5543680	3621 3.5588285	3658 3.5632437
585 3.5544892	3622 3.5589484	3659 3.5633624
586 3.5546103	3623 3.5590683	3660 3.5634811
587 3.5547314	3624 3.5591882	3661 3.5635997
588 3.5548524	3625 3.5593080	3662 3.5637183

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3663	3.5638369	3700	3.5682017	3737	3.5725231
3664	3.5639555	3701	3.5683191	3738	3.5726395
3665	3.5640740	3702	3.5684364	3739	3.5727559
3666	3.5641925	3703	3.5685537	3740	3.5728716
3667	3.5643109	3704	3.5686710	3741	3.5729877
3668	3.5644293	3705	3.5687882	3742	3.5731038
3669	3.5645477	3706	3.5689054	3743	3.5732199
3670	3.5646661	3707	3.5690225	3744	3.5733358
3671	3.5647844	3708	3.5691397	3745	3.5734518
3672	3.5649027	3709	3.5692568	3746	3.5735678
3673	3.5650209	3710	3.5693739	3747	3.5736837
3674	3.5651392	3711	3.5694910	3748	3.5737996
3675	3.5652573	3712	3.5696080	3749	3.5739154
3676	3.5653755	3713	3.5697249	3750	3.5740313
3677	3.5654936	3714	3.5698419	3751	3.5741471
3678	3.5656117	3715	3.5699588	3752	3.5742628
3679	3.5657298	3716	3.5700757	3753	3.5743786
3680	3.5658478	3717	3.5701926	3754	3.5744943
3681	3.5659658	3718	3.5703094	3755	3.5746099
3682	3.5660838	3719	3.5704262	3756	3.5747256
3683	3.5662017	3720	3.5705429	3757	3.5748412
3684	3.5663196	3721	3.5706597	3758	3.5749568
3685	3.5664375	3722	3.5707764	3759	3.5750723
3686	3.5665553	3723	3.5708930	3760	3.5751878
3687	3.5666731	3724	3.5710097	3761	3.5753033
3688	3.5667909	3725	3.5711263	3762	3.5754188
3689	3.5669087	3726	3.5712428	3763	3.5755342
3690	3.5670264	3727	3.5713594	3764	3.5756496
3691	3.5671440	3728	3.5714759	3765	3.5757650
3692	3.5672617	3729	3.5715924	3766	3.5758803
3693	3.5673793	3730	3.5717088	3767	3.5759956
3694	3.5674969	3731	3.5718252	3768	3.5761109
3695	3.5676144	3732	3.5719416	3769	3.5762261
3696	3.5677320	3733	3.5720580	3770	3.5763413
3697	3.5678494	3734	3.5721743	3771	3.5764565
3698	3.5679669	3735	3.5722906	3772	3.5765717
3699	3.5680843	3736	3.5724069	3773	3.5766868

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3774	3.5768019	3811	3.5810389	3848	3.5852351
3775	3.5769169	3812	3.5811529	3849	3.5853479
3776	3.5770320	3813	3.5812668	3850	3.5854607
3777	3.5771470	3814	3.5813807	3851	3.5855735
3778	3.5772620	3815	3.5814945	3852	3.5856863
3779	3.5773769	3816	3.5816084	3853	3.5857990
3780	3.5774918	3817	3.5817222	3854	3.5859117
3781	3.5776067	3818	3.5818359	3855	3.5860244
3782	3.5777215	3819	3.5819497	3856	3.5861370
3783	3.5778363	3820	3.5820634	3857	3.5862496
3784	3.5779511	3821	3.5821770	3858	3.5863622
3785	3.5780659	3822	3.5822907	3859	3.5864748
3786	3.5781806	3823	3.5824043	3860	3.5865873
3787	3.5782953	3824	3.5825179	3861	3.5866998
3788	3.5784100	3825	3.5826314	3862	3.5868123
3789	3.5785246	3826	3.5827450	3863	3.5869247
3790	3.5786392	3827	3.5828585	3864	3.5870371
3791	3.5787538	3828	3.5829719	3865	3.5871495
3792	3.5788683	3829	3.5830854	3866	3.5872618
3793	3.5789828	3830	3.5831988	3867	3.5873742
3794	3.5790972	3831	3.5833122	3868	3.5874865
3795	3.5792118	3832	3.5834255	3869	3.5875987
3796	3.5793262	3833	3.5835388	3870	3.5877110
3797	3.5794406	3834	3.5836521	3871	3.5878232
3798	3.5795550	3835	3.5837654	3872	3.5879353
3799	3.5796693	3836	3.5838786	3873	3.5880475
3800	3.5797836	3837	3.5839918	3874	3.5881596
3801	3.5798979	3838	3.5841050	3875	3.5882717
3802	3.5800121	3839	3.5842181	3876	3.5883838
3803	3.5801263	3840	3.5843312	3877	3.5884958
3804	3.5802405	3841	3.5844443	3878	3.5886078
3805	3.5803547	3842	3.5845574	3879	3.5887198
3806	3.5804688	3843	3.5846704	3880	3.5888317
3807	3.5805829	3844	3.5847834	3881	3.5889436
3808	3.5806969	3845	3.5848963	3882	3.5890555
3809	3.5808110	3846	3.5850093	3883	3.5891674
3810	3.5809250	3847	3.5851222	3884	3.5892792

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
3885	3.5893910	3922	3.5935076	3959	3.5975855
3886	3.5895028	3923	3.5936183	3960	3.5976952
3887	3.5896145	3924	3.5937290	3961	3.5978048
3888	3.5897262	3925	3.5938397	3962	3.5979144
3889	3.5898379	3926	3.5939503	3963	3.5980241
3890	3.5899496	3927	3.5940609	3964	3.5981336
3891	3.5900612	3928	3.5941715	3965	3.5982431
3892	3.5901728	3929	3.5942820	3966	3.5983527
3893	3.5902844	3930	3.5943925	3967	3.5984623
3894	3.5903959	3931	3.5945030	3968	3.5985717
3895	3.5905075	3932	3.5946135	3969	3.5986811
3896	3.5906189	3933	3.5947239	3970	3.5987905
3897	3.5907304	3934	3.5948344	3971	3.5988999
3898	3.5908418	3935	3.5949447	3972	3.5990093
3899	3.5909532	3936	3.5950551	3973	3.5991186
3900	3.5910646	3937	3.5951654	3974	3.5992279
3901	3.5911759	3938	3.5952757	3975	3.5993371
3902	3.5912873	3939	3.5953860	3976	3.5994464
3903	3.5913985	3940	3.5954962	3977	3.5995556
3904	3.5915098	3941	3.5956064	3978	3.5996648
3905	3.5916210	3942	3.5957166	3979	3.5997739
3906	3.5917322	3943	3.5958268	3980	3.5998831
3907	3.5918434	3944	3.5959369	3981	3.5999923
3908	3.5919546	3945	3.5960470	3982	3.6001013
3909	3.5920657	3946	3.5961571	3983	3.6002105
3910	3.5921768	3947	3.5962671	3984	3.6003197
3911	3.5922878	3948	3.5963771	3985	3.6004287
3912	3.5923988	3949	3.5964871	3986	3.6005377
3913	3.5925098	3950	3.5965971	3987	3.6006468
3914	3.5926208	3951	3.5967070	3988	3.6007558
3915	3.5927318	3952	3.5968169	3989	3.6008648
3916	3.5928427	3953	3.5969268	3990	3.6009739
3917	3.5929536	3954	3.5970376	3991	3.6010827
3918	3.5930644	3955	3.5971465	3992	3.6011905
3919	3.5931753	3956	3.5972563	3993	3.6012993
3920	3.5932861	3957	3.5973660	3994	3.6014080
3921	3.5933968	3958	3.5974758	3995	3.6015168

Nam.	Logarithm.	Nam.	Logarithm.	Nam.	Logarithm.
3995	3.6016255	4033	3.6056282	4070	3.6095944
3997	3.6017341	4034	3.6057359	4071	3.6097011
3998	3.6018428	4035	3.6058435	4072	3.6098078
3999	3.6019514	4036	3.6059512	4073	3.6099144
4000	3.6020600	4037	3.6060587	4074	3.6100210
4001	3.6021685	4038	3.6061663	4075	3.6101276
4002	3.6022771	4039	3.6062738	4076	3.6102342
4003	3.6023856	4040	3.6063814	4077	3.6103407
4004	3.6024941	4041	3.6064888	4078	3.6104472
4005	3.6026025	4042	3.6065963	4079	3.6105537
4006	3.6027109	4043	3.6067037	4080	3.6106602
4007	3.6028193	4044	3.6068111	4081	3.6107666
4008	3.6029277	4045	3.6069185	4082	3.6108730
4009	3.6030361	4046	3.6070259	4083	3.6109794
4010	3.6031444	4047	3.6071332	4084	3.6110857
4011	3.6032527	4048	3.6072405	4085	3.6111921
4012	3.6033609	4049	3.6073478	4086	3.6112984
4013	3.6034692	4050	3.6074550	4087	3.6114046
4014	3.6035774	4051	3.6075622	4088	3.6115109
4015	3.6036855	4052	3.6076694	4089	3.6116171
4016	3.6037937	4053	3.6077766	4090	3.6117233
4017	3.6039018	4054	3.6078837	4091	3.6118295
4018	3.6040099	4055	3.6079909	4092	3.6119356
4019	3.6041180	4056	3.6080979	4093	3.6120417
4020	3.6042261	4057	3.6082050	4094	3.6121478
4021	3.6043341	4058	3.6083120	4095	3.6122539
4022	3.6044421	4059	3.6084190	4096	3.6123599
4023	3.6045500	4060	3.6085260	4097	3.6124660
4024	3.6046580	4061	3.6086330	4098	3.6125720
4025	3.6047659	4062	3.6087399	4099	3.6126779
4026	3.6048738	4063	3.6088468	4100	3.6127839
4027	3.6049816	4064	3.6089537	4101	3.6128898
4028	3.6050895	4065	3.6090605	4102	3.6129957
4029	3.6051973	4066	3.6091674	4103	3.6131015
4030	3.6053050	4067	3.6092742	4104	3.6132073
4031	3.6054128	4068	3.6093809	4105	3.6133132
4032	3.6055205	4069	3.6094877	4106	3.6134189

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
4107	3.6135247	4144	3.6174197	4181	3.6212802
4108	3.6136304	4145	3.6175245	4182	3.6213840
4109	3.6137361	4146	3.6176293	4183	3.6214879
4110	3.6138418	4147	3.6177340	4184	3.6215917
4111	3.6139475	4148	3.6178387	4185	3.6216955
4112	3.6140531	4149	3.6179434	4186	3.6217992
4113	3.6141587	4150	3.6180481	4187	3.6219030
4114	3.6142643	4151	3.6181527	4188	3.6220067
4115	3.6143698	4152	3.6182573	4189	3.6221104
4116	3.6144754	4153	3.6183619	4190	3.6222140
4117	3.6145809	4154	3.6184665	4191	3.6223177
4118	3.6146863	4155	3.6185710	4192	3.6224213
4119	3.6147918	4156	3.6186755	4193	3.6225249
4120	3.6148972	4157	3.6187800	4194	3.6226284
4121	3.6150026	4158	3.6188845	4195	3.6227320
4122	3.6151080	4159	3.6189889	4196	3.6228355
4123	3.6152133	4160	3.6190933	4197	3.6229390
4124	3.6153187	4161	3.6191977	4198	3.6230424
4125	3.6154240	4162	3.6193021	4199	3.6231459
4126	3.6155292	4163	3.6194064	4200	3.6232493
4127	3.6156345	4164	3.6195107	4201	3.6233527
4128	3.6157397	4165	3.6196150	4202	3.6234560
4129	3.6158448	4166	3.6197193	4203	3.6235594
4130	3.6159501	4167	3.6198235	4204	3.6236627
4131	3.6160552	4168	3.6199277	4205	3.6237660
4132	3.6161603	4169	3.6200319	4206	3.6238693
4133	3.6162654	4170	3.6201360	4207	3.6239725
4134	3.6163705	4171	3.6202402	4208	3.6240757
4135	3.6164755	4172	3.6203443	4209	3.6241789
4136	3.6165805	4173	3.6204484	4210	3.6242821
4137	3.6166855	4174	3.6205524	4211	3.6243852
4138	3.6167905	4175	3.6206565	4212	3.6244884
4139	3.6168954	4176	3.6207605	4213	3.6245915
4140	3.6170003	4177	3.6208645	4214	3.6246945
4141	3.6171051	4178	3.6209684	4215	3.6247976
4142	3.6172101	4179	3.6210724	4216	3.6249006
4143	3.6173149	4180	3.6211763	4217	3.6250036

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
4218	3.6251066	4255	3.6288996	4292	3.6326597
4219	3.6252095	4256	3.6290016	4293	3.6327609
4220	3.6253124	4257	3.6291036	4294	3.6328620
4221	3.6254153	4258	3.6292057	4295	3.6329632
4222	3.6255182	4259	3.6293076	4296	3.6330643
4223	3.6256211	4260	3.6294096	4297	3.6331653
4224	3.6257239	4261	3.6295115	4298	3.6332664
4225	3.6258267	4262	3.6296134	4299	3.6333674
4226	3.6259295	4263	3.6297153	4300	3.6334685
4227	3.6260322	4264	3.6298172	4301	3.6335694
4228	3.6261350	4265	3.6299190	4302	3.6336704
4229	3.6262377	4266	3.6300208	4303	3.6337713
4230	3.6263404	4267	3.6301226	4304	3.6338723
4231	3.6264430	4268	3.6302244	4305	3.6339732
4232	3.6265457	4269	3.6303262	4306	3.6340740
4233	3.6266483	4270	3.6304279	4307	3.6341749
4234	3.6267509	4271	3.6305296	4308	3.6342757
4235	3.6268534	4272	3.6306312	4309	3.6343765
4236	3.6269559	4273	3.6307329	4310	3.6344773
4237	3.6270585	4274	3.6308345	4311	3.6345780
4238	3.6271610	4275	3.6309361	4312	3.6346788
4239	3.6272634	4276	3.6310377	4313	3.6347795
4240	3.6273659	4277	3.6311392	4314	3.6348801
4241	3.6274683	4278	3.6312408	4315	3.6349808
4242	3.6275707	4279	3.6313423	4316	3.6350814
4243	3.6276730	4280	3.6314438	4317	3.6351820
4244	3.6277754	4281	3.6315452	4318	3.6352826
4245	3.6278777	4282	3.6316467	4319	3.6353832
4246	3.6279800	4283	3.6317481	4320	3.6354837
4247	3.6280823	4284	3.6318495	4321	3.6355843
4248	3.6281845	4285	3.6319508	4322	3.6356848
4249	3.6282867	4286	3.6320522	4323	3.6357852
4250	3.6283889	4287	3.6321535	4324	3.6358857
4251	3.6284911	4288	3.6322548	4325	3.6359861
4252	3.6285933	4289	3.6323560	4326	3.6360865
4253	3.6286954	4290	3.6324573	4327	3.6361869
4254	3.6287975	4291	3.6325585	4328	3.6362872

Num. Logarithm.	Num. Logarithm.	Num. Logarithm.
4329 3.6363876	4366 3.6400837	4403 3.6437487
4330 3.6364879	4367 3.6401832	4404 3.6438473
4331 3.6365882	4368 3.6402826	4405 3.6439459
4332 3.6366884	4369 3.6403820	4406 3.6440445
4333 3.6367887	4370 3.6404814	4407 3.6441430
4334 3.6368889	4371 3.6405808	4408 3.6442416
4335 3.6369891	4372 3.6406802	4409 3.6443401
4336 3.6370893	4373 3.6407795	4410 3.6444386
4337 3.6371894	4374 3.6408788	4411 3.6445371
4338 3.6372895	4375 3.6409781	4412 3.6446355
4339 3.6373896	4376 3.6410773	4413 3.6447339
4340 3.6374897	4377 3.6411765	4414 3.6448323
4341 3.6375898	4378 3.6412758	4415 3.6449307
4342 3.6376898	4379 3.6413749	4416 3.6450291
4343 3.6377898	4380 3.6414741	4417 3.6451274
4344 3.6378898	4381 3.6415733	4418 3.6452257
4345 3.6379898	4382 3.6416724	4419 3.6453240
4346 3.6380897	4383 3.6417715	4420 3.6454223
4347 3.6381896	4384 3.6418705	4421 3.6455205
4348 3.6382895	4385 3.6419696	4422 3.6456187
4349 3.6383894	4386 3.6420686	4423 3.6457169
4350 3.6384893	4387 3.6421676	4424 3.6458151
4351 3.6385891	4388 3.6422666	4425 3.6459133
4352 3.6386889	4389 3.6423656	4426 3.6460114
4353 3.6387887	4390 3.6424645	4427 3.6461095
4354 3.6388884	4391 3.6425634	4428 3.6462076
4355 3.6389882	4392 3.6426623	4429 3.6463057
4356 3.6390879	4393 3.6427612	4430 3.6464037
4357 3.6391876	4394 3.6428601	4431 3.6465017
4358 3.6392872	4395 3.6429589	4432 3.6465997
4359 3.6393869	4396 3.6430577	4433 3.6466977
4360 3.6394865	4397 3.6431565	4434 3.6467957
4361 3.6395861	4398 3.6432552	4435 3.6468936
4362 3.6396857	4399 3.6433540	4436 3.6469915
4363 3.6397852	4400 3.6434527	4437 3.6470894
4364 3.6398847	4401 3.6435514	4438 3.6471873
4365 3.6399842	4402 3.6436500	4439 3.6472851

Nam.	Logarithm.	Nam.	Logarithm.	Nam.	Logarithm.
4440	3.6473830	4477	3.6509871	4514	3.6545616
4441	3.6474808	4478	3.6510841	4515	3.6546578
4442	3.6475785	4479	3.6511811	4516	3.6547539
4443	3.6476763	4480	3.6512780	4517	3.6548501
4444	3.6477740	4481	3.6513749	4518	3.6549462
4445	3.6478718	4482	3.6514719	4519	3.6550423
4446	3.6479695	4483	3.6515687	4520	3.6551384
4447	3.6480671	4484	3.6516656	4521	3.6552345
4448	3.6481648	4485	3.6517624	4522	3.6553306
4449	3.6482624	4486	3.6518593	4523	3.6554266
4450	3.6483600	4487	3.6519561	4524	3.6555226
4451	3.6484576	4488	3.6520528	4525	3.6556186
4452	3.6485552	4489	3.6521496	4526	3.6557145
4453	3.6486527	4490	3.6522463	4527	3.6558105
4454	3.6487502	4491	3.6523430	4528	3.6559064
4455	3.6488477	4492	3.6524397	4529	3.6560023
4456	3.6489452	4493	3.6525364	4530	3.6560982
4457	3.6490426	4494	3.6526331	4531	3.6561941
4458	3.6491401	4495	3.6527297	4532	3.6562899
4459	3.6492375	4496	3.6528263	4533	3.6563857
4460	3.6493349	4497	3.6529229	4534	3.6564815
4461	3.6494322	4498	3.6530195	4535	3.6565773
4462	3.6495296	4499	3.6531160	4536	3.6566730
4463	3.6496269	4500	3.6532125	4537	3.6567688
4464	3.6497242	4501	3.6533090	4538	3.6568645
4465	3.6498215	4502	3.6534055	4539	3.6569602
4466	3.6499187	4503	3.6535019	4540	3.6570559
4467	3.6500160	4504	3.6535984	4541	3.6571515
4468	3.6501132	4505	3.6536948	4542	3.6572471
4469	3.6502104	4506	3.6537912	4543	3.6573427
4470	3.6503075	4507	3.6538876	4544	3.6574383
4471	3.6504047	4508	3.6539839	4545	3.6575339
4472	3.6505018	4509	3.6540802	4546	3.6576294
4473	3.6505989	4510	3.6541765	4547	3.6577250
4474	3.6506960	4511	3.6542728	4548	3.6578205
4475	3.6507930	4512	3.6543691	4549	3.6579159
4476	3.6508901	4513	3.6544653	4550	3.6570114

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
4551	3.6581068	4588	3.6616234	4625	3.6651117
4552	3.6582023	4589	3.6617181	4626	3.6652056
4553	3.6582976	4590	3.6618127	4627	3.6652995
4554	3.6583930	4591	3.6619073	4628	3.6653933
4555	3.6584884	4592	3.6620019	4629	3.6654872
4556	3.6585837	4593	3.6620964	4630	3.6655810
4557	3.6586790	4594	3.6621910	4631	3.6656748
4558	3.6587743	4595	3.6622855	4632	3.6657685
4559	3.6588696	4596	3.6623800	4633	3.6658623
4560	3.6589648	4597	3.6624745	4634	3.6659560
4561	3.6590601	4598	3.6625690	4635	3.6660497
4562	3.6591553	4599	3.6626634	4636	3.6661434
4563	3.6592505	4600	3.6627578	4637	3.6662371
4564	3.6593456	4601	3.6628522	4638	3.6663307
4565	3.6594408	4602	3.6629466	4639	3.6664244
4566	3.6595359	4603	3.6630410	4640	3.6665180
4567	3.6596310	4604	3.6631353	4641	3.6666116
4568	3.6597261	4605	3.6632296	4642	3.6667051
4569	3.6598212	4606	3.6633239	4643	3.6667987
4570	3.6599162	4607	3.6634182	4644	3.6668922
4571	3.6600112	4608	3.6635125	4645	3.6669857
4572	3.6601062	4609	3.6636067	4646	3.6670792
4573	3.6602012	4610	3.6637009	4647	3.6671727
4574	3.6602962	4611	3.6637951	4648	3.6672661
4575	3.6603911	4612	3.6638893	4649	3.6673595
4576	3.6604860	4613	3.6639835	4650	3.6674530
4577	3.6605809	4614	3.6640776	4651	3.6675463
4578	3.6606758	4615	3.6641717	4652	3.6676397
4579	3.6607706	4616	3.6642658	4653	3.6677331
4580	3.6608655	4617	3.6643599	4654	3.6678264
4581	3.6609603	4618	3.6644539	4655	3.6679197
4582	3.6610551	4619	3.6645480	4656	3.6680130
4583	3.6611499	4620	3.6646420	4657	3.6681062
4584	3.6612446	4621	3.6647360	4658	3.6681995
4585	3.6613393	4622	3.6648299	4659	3.6682927
4586	3.6614340	4623	3.6649239	4660	3.6683859
4587	3.6615287	4624	3.6650178	4661	3.6684791

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
662	3.6685723	4699	3.6720044	4736	3.6754117
663	3.6686654	4700	3.6720979	4737	3.6755034
664	3.6687585	4701	3.6721903	4738	3.6755951
665	3.6688516	4702	3.6722826	4739	3.6756867
666	3.6689447	4703	3.6723750	4740	3.6757783
667	3.6690378	4704	3.6724673	4741	3.6758700
668	3.6691308	4705	3.6725596	4742	3.6759615
669	3.6692239	4706	3.6726519	4743	3.6760531
670	3.6693169	4707	3.6727442	4744	3.6761447
671	3.6694099	4708	3.6728365	4745	3.6762362
672	3.6695028	4709	3.6729287	4746	3.6763277
673	3.6695958	4710	3.6730209	4747	3.6764192
674	3.6696887	4711	3.6731131	4748	3.6765107
675	3.6697816	4712	3.6732053	4749	3.6766022
676	3.6698745	4713	3.6732974	4750	3.6766936
677	3.6699674	4714	3.6733896	4751	3.6767850
678	3.6700602	4715	3.6734817	4752	3.6768764
679	3.6701530	4716	3.6735738	4753	3.6769678
680	3.6702459	4717	3.6736659	4754	3.6770592
681	3.6703386	4718	3.6737579	4755	3.6771505
682	3.6704314	4719	3.6738500	4756	3.6772418
683	3.6705242	4720	3.6739420	4757	3.6773332
684	3.6706169	4721	3.6740340	4758	3.6774244
685	3.6707096	4722	3.6741260	4759	3.6775157
686	3.6708023	4723	3.6742179	4760	3.6776069
687	3.6708950	4724	3.6743099	4761	3.6776982
688	3.6709876	4725	3.6744018	4762	3.6777894
689	3.6710802	4726	3.6744937	4763	3.6778806
690	3.6711728	4727	3.6745856	4764	3.6779718
691	3.6712654	4728	3.6746775	4765	3.6780629
692	3.6713580	4729	3.6747693	4766	3.6781540
693	3.6714506	4730	3.6748611	4767	3.6782452
694	3.6715431	4731	3.6749529	4768	3.6783362
695	3.6716356	4732	3.6750447	4769	3.6784273
696	3.6717281	4733	3.6751365	4770	3.6785184
697	3.6718206	4734	3.6752283	4771	3.6786094
698	3.6719130	4735	3.6753200	4772	3.6787004

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
4773	3.6787914	4810	3.6821451	4847	3.6854730	4884	3.6888000
4774	3.6788824	4811	3.6822354	4848	3.6855634	4885	3.6888900
4775	3.6789734	4812	3.6823256	4849	3.6856538	4886	3.6889800
4776	3.6790643	4813	3.6824159	4850	3.6857441	4887	3.6890700
4777	3.6791552	4814	3.6825061	4851	3.6858345	4888	3.6891600
4778	3.6792461	4815	3.6825963	4852	3.6859248	4889	3.6892500
4779	3.6793370	4816	3.6826865	4853	3.6860152	4890	3.6893400
4780	3.6794279	4817	3.6827768	4854	3.6861056	4891	3.6894300
4781	3.6795187	4818	3.6828668	4855	3.6861960	4892	3.6895200
4782	3.6796096	4819	3.6829569	4856	3.6862864	4893	3.6896100
4783	3.6797004	4820	3.6830470	4857	3.6863768	4894	3.6897000
4784	3.6797912	4821	3.6831371	4858	3.6864672	4895	3.6897900
4785	3.6798819	4822	3.6832272	4859	3.6865576	4896	3.6898800
4786	3.6799727	4823	3.6833173	4860	3.6866480	4897	3.6899700
4787	3.6800634	4824	3.6834073	4861	3.6867384	4898	3.6900600
4788	3.6801541	4825	3.6834973	4862	3.6868288	4899	3.6901500
4789	3.6802448	4826	3.6835873	4863	3.6869192	4900	3.6902400
4790	3.6803355	4827	3.6836773	4864	3.6870096	4901	3.6903300
4791	3.6804262	4828	3.6837673	4865	3.6871000	4902	3.6904200
4792	3.6805168	4829	3.6838572	4866	3.6871904	4903	3.6905100
4793	3.6806074	4830	3.6839471	4867	3.6872808	4904	3.6906000
4794	3.6806980	4831	3.6840370	4868	3.6873712	4905	3.6906900
4795	3.6807886	4832	3.6841269	4869	3.6874616	4906	3.6907800
4796	3.6808792	4833	3.6842168	4870	3.6875520	4907	3.6908700
4797	3.6809697	4834	3.6843066	4871	3.6876424	4908	3.6909600
4798	3.6810602	4835	3.6843965	4872	3.6877328	4909	3.6910500
4799	3.6811507	4836	3.6844863	4873	3.6878232	4910	3.6911400
4800	3.6812412	4837	3.6845761	4874	3.6879136	4911	3.6912300
4801	3.6813317	4838	3.6846659	4875	3.6880040	4912	3.6913200
4802	3.6814222	4839	3.6847556	4876	3.6880944	4913	3.6914100
4803	3.6815126	4840	3.6848454	4877	3.6881848	4914	3.6915000
4804	3.6816030	4841	3.6849351	4878	3.6882752	4915	3.6915900
4805	3.6816934	4842	3.6850248	4879	3.6883656	4916	3.6916800
4806	3.6817838	4843	3.6851145	4880	3.6884560	4917	3.6917700
4807	3.6818741	4844	3.6852041	4881	3.6885464	4918	3.6918600
4808	3.6819645	4845	3.6852938	4882	3.6886368	4919	3.6919500
4809	3.6820548	4846	3.6853834	4883	3.6887272	4920	3.6920400

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
884	3.0887750	4921	3.6920534	4958	3.6953065
885	3.6888546	4922	3.6921416	4959	3.6953941
886	3.6889535	4923	3.6922298	4960	3.6954817
887	3.6890423	4924	3.6923180	4961	3.6955692
888	3.6891312	4925	3.6924062	4962	3.6956568
889	3.6892200	4926	3.6924944	4963	3.6957443
890	3.6893089	4927	3.6925826	4964	3.6958318
891	3.6893977	4928	3.6926707	4965	3.6959193
892	3.6894864	4929	3.6927588	4966	3.6960067
893	3.6895752	4930	3.6928469	4967	3.6960942
894	3.6896640	4931	3.6929350	4968	3.6961816
895	3.6897527	4932	3.6930231	4969	3.6962690
896	3.6898414	4933	3.6931111	4970	3.6963564
897	3.6899301	4934	3.6931991	4971	3.6964438
898	3.6900188	4935	3.6932872	4972	3.6965311
899	3.6901074	4936	3.6933752	4973	3.6966185
900	3.6901961	4937	3.6934631	4974	3.6967058
901	3.6902847	4938	3.6935511	4975	3.6967931
902	3.6903733	4939	3.6936390	4976	3.6968804
903	3.6904619	4940	3.6937269	4977	3.6969676
904	3.6905505	4941	3.6938148	4978	3.6970549
905	3.6906390	4942	3.6939027	4979	3.6971421
906	3.6907275	4943	3.6939906	4980	3.6972293
907	3.6908161	4944	3.6940785	4981	3.6973165
908	3.6909046	4945	3.6941663	4982	3.6974037
909	3.6909930	4946	3.6942541	4983	3.6974909
910	3.6910815	4947	3.6943419	4984	3.6975780
911	3.6911699	4948	3.6944297	4985	3.6976652
912	3.6912584	4949	3.6945174	4986	3.6977523
913	3.6913468	4950	3.6946052	4987	3.6978394
914	3.6914352	4951	3.6946929	4988	3.6979264
915	3.6915235	4952	3.6947806	4989	3.6980135
916	3.6916119	4953	3.6948683	4990	3.6981005
917	3.6917002	4954	3.6949560	4991	3.6981876
918	3.6917883	4955	3.6950436	4992	3.6982746
919	3.6918768	4956	3.6951313	4993	3.6983616
920	3.6919651	4957	3.6952189	4994	3.6984485

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
4995	3.6985355	5032	3.7017406	5069	3.7049223
4996	3.6986224	5033	3.7018269	5070	3.7050080
4997	3.6987093	5034	3.7019132	5071	3.7050936
4998	3.6987963	5035	3.7019995	5072	3.7051792
4999	3.6988831	5036	3.7020857	5073	3.7052649
5000	3.6989700	5037	3.7021719	5074	3.7053505
5001	3.6990569	5038	3.7022582	5075	3.7054360
5002	3.6991437	5039	3.7023444	5076	3.7055216
5003	3.6992305	5040	3.7024305	5077	3.7056072
5004	3.6993173	5041	3.7025167	5078	3.7056927
5005	3.6994041	5042	3.7026028	5079	3.7057780
5006	3.6994908	5043	3.7026890	5080	3.7058637
5007	3.6995776	5044	3.7027751	5081	3.7059490
5008	3.6996643	5045	3.7028612	5082	3.7060347
5009	3.6997510	5046	3.7029472	5083	3.7061202
5010	3.6998377	5047	3.7030333	5084	3.7062055
5011	3.6999244	5048	3.7031193	5085	3.7062910
5012	3.7000111	5049	3.7032054	5086	3.7063766
5013	3.7000977	5050	3.7032914	5087	3.7064617
5014	3.7001843	5051	3.7033774	5088	3.7065471
5015	3.7002709	5052	3.7034633	5089	3.7066323
5016	3.7003575	5053	3.7035493	5090	3.7067174
5017	3.7004441	5054	3.7036352	5091	3.7068028
5018	3.7005307	5055	3.7037212	5092	3.7068880
5019	3.7006172	5056	3.7038071	5093	3.7069735
5020	3.7007037	5057	3.7038929	5094	3.7070588
5021	3.7007902	5058	3.7039788	5095	3.7071444
5022	3.7008767	5059	3.7040647	5096	3.7072299
5023	3.7009632	5060	3.7041505	5097	3.7073154
5024	3.7010496	5061	3.7042363	5098	3.7073999
5025	3.7011361	5062	3.7043221	5099	3.7074849
5026	3.7012225	5063	3.7044079	5100	3.7075700
5027	3.7013089	5064	3.7044937	5101	3.7076553
5028	3.7013953	5065	3.7045794	5102	3.7077408
5029	3.7014816	5066	3.7046652	5103	3.7078261
5030	3.7015680	5067	3.7047509	5104	3.7079110
5031	3.7016543	5068	3.7048366	5105	3.7079955

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5106	3.7080808	5143	3.7112165	5180	3.7143298
5107	3.7081659	5144	3.7113010	5181	3.7144136
5108	3.7082509	5145	3.7113854	5182	3.7144974
5109	3.7083359	5146	3.7114698	5183	3.7145812
5110	3.7084209	5147	3.7115542	5184	3.7146650
5111	3.7085059	5148	3.7116385	5185	3.7147488
5112	3.7085908	5149	3.7117229	5186	3.7148325
5113	3.7086758	5150	3.7118072	5187	3.7149162
5114	3.7087607	5151	3.7118915	5188	3.7150000
5115	3.7088456	5152	3.7119759	5189	3.7150837
5116	3.7089305	5153	3.7120601	5190	3.7151674
5117	3.7090154	5154	3.7121444	5191	3.7152510
5118	3.7091003	5155	3.7122287	5192	3.7153347
5119	3.7091851	5156	3.7123129	5193	3.7154183
5120	3.7092700	5157	3.7123971	5194	3.7155019
5121	3.7093548	5158	3.7124813	5195	3.7155856
5122	3.7094396	5159	3.7125655	5196	3.7156691
5123	3.7095244	5160	3.7126497	5197	3.7157527
5124	3.7096091	5161	3.7127339	5198	3.7158363
5125	3.7096939	5162	3.7128180	5199	3.7159198
5126	3.7097786	5163	3.7129021	5200	3.7160033
5127	3.7098633	5164	3.7129862	5201	3.7160869
5128	3.7099480	5165	3.7130703	5202	3.7161703
5129	3.7100327	5166	3.7131544	5203	3.7162538
5130	3.7101174	5167	3.7132385	5204	3.7163373
5131	3.7102020	5168	3.7133225	5205	3.7164207
5132	3.7102866	5169	3.7134065	5206	3.7165042
5133	3.7103713	5170	3.7134905	5207	3.7165876
5134	3.7104559	5171	3.7135745	5208	3.7166710
5135	3.7105404	5172	3.7136585	5209	3.7167544
5136	3.7106250	5173	3.7137425	5210	3.7168377
5137	3.7107096	5174	3.7138264	5211	3.7169211
5138	3.7107941	5175	3.7139104	5212	3.7170044
5139	3.7108786	5176	3.7139943	5213	3.7170877
5140	3.7109631	5177	3.7140782	5214	3.7171710
5141	3.7110476	5178	3.7141620	5215	3.7172543
5142	3.7111321	5179	3.7142459	5216	3.7173376

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5217	3.7174208	5254	3.7204901	5291	3.7235378
5218	3.7175041	5255	3.7205727	5292	3.7236198
5219	3.7175873	5256	3.7206554	5293	3.7237019
5220	3.7176705	5257	3.7207380	5294	3.7237839
5221	3.7177537	5258	3.7208260	5295	3.7238660
5222	3.7178369	5259	3.7209032	5296	3.7239480
5223	3.7179200	5260	3.7209857	5297	3.7240300
5224	3.7180032	5261	3.7210683	5298	3.7241120
5225	3.7180863	5262	3.7211508	5299	3.7241939
5226	3.7181694	5263	3.7212334	5300	3.7242759
5227	3.7182525	5264	3.7213159	5301	3.7243578
5228	3.7183356	5265	3.7213984	5302	3.7244397
5229	3.7184186	5266	3.7214809	5303	3.7245216
5230	3.7185017	5267	3.7215633	5304	3.7246035
5231	3.7185847	5268	3.7216458	5305	3.7246854
5232	3.7186677	5269	3.7217282	5306	3.7247672
5233	3.7187507	5270	3.7218106	5307	3.7248491
5234	3.7188337	5271	3.7218930	5308	3.7249309
5235	3.7189167	5272	3.7219754	5309	3.7250127
5236	3.7189996	5273	3.7220578	5310	3.7250944
5237	3.7190826	5274	3.7221401	5311	3.7251763
5238	3.7191655	5275	3.7222225	5312	3.7252581
5239	3.7192484	5276	3.7223048	5313	3.7253399
5240	3.7193313	5277	3.7223871	5314	3.7254219
5241	3.7194142	5278	3.7224694	5315	3.7255038
5242	3.7194970	5279	3.7225517	5316	3.7255856
5243	3.7195799	5280	3.7226339	5317	3.7256677
5244	3.7196627	5281	3.7227162	5318	3.7257489
5245	3.7197455	5282	3.7227984	5319	3.7258300
5246	3.7198283	5283	3.7228806	5320	3.7259111
5247	3.7199111	5284	3.7229628	5321	3.7259933
5248	3.7199938	5285	3.7230450	5322	3.7260749
5249	3.7200766	5286	3.7231272	5323	3.7261566
5250	3.7201593	5287	3.7232093	5324	3.7262380
5251	3.7202420	5288	3.7232914	5325	3.7263199
5252	3.7203247	5289	3.7233736	5326	3.7264016
5253	3.7204074	5290	3.7234557	5327	3.7264832

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5328	3.7265642	5365	3.7295697	5402	3.7325546
5329	3.7266457	5366	3.7296507	5403	3.7326350
5330	3.7267272	5367	3.7297316	5404	3.7327153
5331	3.7268087	5368	3.7298125	5405	3.7327957
5332	3.7268901	5369	3.7298934	5406	3.7328760
5333	3.7269716	5370	3.7299743	5407	3.7329564
5334	3.7270530	5371	3.7300551	5408	3.7330367
5335	3.7271344	5372	3.7301360	5409	3.7331170
5336	3.7272158	5373	3.7302168	5410	3.7331973
5337	3.7272972	5374	3.7302977	5411	3.7332775
5338	3.7273786	5375	3.7303785	5412	3.7333578
5339	3.7274599	5376	3.7304593	5413	3.7334380
5340	3.7275413	5377	3.7305400	5414	3.7335182
5341	3.7276226	5378	3.7306208	5415	3.7335985
5342	3.7277039	5379	3.7307015	5416	3.7336787
5343	3.7277852	5380	3.7307823	5417	3.7337588
5344	3.7278664	5381	3.7308630	5418	3.7338390
5345	3.7279477	5382	3.7309437	5419	3.7339191
5346	3.7280290	5383	3.7310244	5420	3.7339993
5347	3.7281102	5384	3.7311051	5421	3.7340794
5348	3.7281914	5385	3.7311857	5422	3.7341595
5349	3.7282726	5386	3.7312663	5423	3.7342396
5350	3.7283538	5387	3.7313470	5424	3.7343197
5351	3.7284349	5388	3.7314276	5425	3.7343997
5352	3.7285161	5389	3.7315082	5426	3.7344798
5353	3.7285972	5390	3.7315888	5427	3.7345598
5354	3.7286784	5391	3.7316693	5428	3.7346398
5355	3.7287595	5392	3.7317499	5429	3.7347198
5356	3.7288406	5393	3.7318304	5430	3.7347998
5357	3.7289216	5394	3.7319109	5431	3.7348798
5358	3.7290027	5395	3.7319914	5432	3.7349598
5359	3.7290838	5396	3.7320719	5433	3.7350397
5360	3.7291648	5397	3.7321524	5434	3.7351196
5361	3.7292458	5398	3.7322329	5435	3.7351995
5362	3.7293268	5399	3.7323133	5436	3.7352794
5363	3.7294078	5400	3.7323938	5437	3.7353593
5364	3.7294888	5401	3.7324742	5438	3.7354392

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5439	3.7355191	5476	3.7384634	5513	3.7413880
5440	3.7355989	5477	3.7385427	5514	3.7414668
5441	3.7356787	5478	3.7386220	5515	3.7415455
5442	3.7357585	5479	3.7387013	5516	3.7416243
5443	3.7358383	5480	3.7387806	5517	3.7417030
5444	3.7359181	5481	3.7388598	5518	3.7417817
5445	3.7359979	5482	3.7389390	5519	3.7418604
5446	3.7360776	5483	3.7390182	5520	3.7419391
5447	3.7361574	5484	3.7390974	5521	3.7420177
5448	3.7362371	5485	3.7391766	5522	3.7420964
5449	3.7363168	5486	3.7392558	5523	3.7421750
5450	3.7363965	5487	3.7393350	5524	3.7422537
5451	3.7364762	5488	3.7394141	5525	3.7423323
5452	3.7365558	5489	3.7394932	5526	3.7424109
5453	3.7366355	5490	3.7395723	5527	3.7424895
5454	3.7367151	5491	3.7396514	5528	3.7425680
5455	3.7367948	5492	3.7397305	5529	3.7426466
5456	3.7368744	5493	3.7398096	5530	3.7427251
5457	3.7369540	5494	3.7398886	5531	3.7428037
5458	3.7370335	5495	3.7399677	5532	3.7428822
5459	3.7371131	5496	3.7400467	5533	3.7429607
5460	3.7371926	5497	3.7401257	5534	3.7430392
5461	3.7372722	5498	3.7402047	5535	3.7431176
5462	3.7373517	5499	3.7402837	5536	3.7431961
5463	3.7374312	5500	3.7403627	5537	3.7432745
5464	3.7375107	5501	3.7404416	5538	3.7433530
5465	3.7375902	5502	3.7405206	5539	3.7434314
5466	3.7376696	5503	3.7405995	5540	3.7435098
5467	3.7377491	5504	3.7406784	5541	3.7435881
5468	3.7378285	5505	3.7407573	5542	3.7436665
5469	3.7379079	5506	3.7408362	5543	3.7437449
5470	3.7379873	5507	3.7409151	5544	3.7438232
5471	3.7380667	5508	3.7409939	5545	3.7439015
5472	3.7381461	5509	3.7410728	5546	3.7439799
5473	3.7382254	5510	3.7411516	5547	3.7440582
5474	3.7383048	5511	3.7412304	5548	3.7441365
5475	3.7383841	5512	3.7413092	5549	3.7442147

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5550	3.7442930	5587	3.7471787	5624	3.7500453
5551	3.7443712	5588	3.7472564	5625	3.7501225
5552	3.7444495	5589	3.7473341	5626	3.7501997
5553	3.7445277	5590	3.7474118	5627	3.7502769
5554	3.7446059	5591	3.7474895	5628	3.7503541
5555	3.7446841	5592	3.7475672	5629	3.7504312
5556	3.7447622	5593	3.7476448	5630	3.7505084
5557	3.7448404	5594	3.7477225	5631	3.7505855
5558	3.7449185	5595	3.7478001	5632	3.7506626
5559	3.7449967	5596	3.7478777	5633	3.7507398
5560	3.7450748	5597	3.7479553	5634	3.7508168
5561	3.7451529	5598	3.7480329	5635	3.7508939
5562	3.7452310	5599	3.7481105	5636	3.7509710
5563	3.7453091	5600	3.7481880	5637	3.7510480
5564	3.7453871	5601	3.7482656	5638	3.7511251
5565	3.7454652	5602	3.7483431	5639	3.7512021
5566	3.7455432	5603	3.7484206	5640	3.7512791
5567	3.7456212	5604	3.7484981	5641	3.7513561
5568	3.7456992	5605	3.7485756	5642	3.7514331
5569	3.7457772	5606	3.7486531	5643	3.7515100
5570	3.7458552	5607	3.7487306	5644	3.7515870
5571	3.7459332	5608	3.7488080	5645	3.7516639
5572	3.7460111	5609	3.7488854	5646	3.7517409
5573	3.7460890	5610	3.7489629	5647	3.7518178
5574	3.7461670	5611	3.7490403	5648	3.7518947
5575	3.7462449	5612	3.7491177	5649	3.7519716
5576	3.7463228	5613	3.7491950	5650	3.7520484
5577	3.7464006	5614	3.7492724	5651	3.7521253
5578	3.7464785	5615	3.7493498	5652	3.7522022
5579	3.7465564	5616	3.7494271	5653	3.7522790
5580	3.7466342	5617	3.7495044	5654	3.7523558
5581	3.7467120	5618	3.7495817	5655	3.7524326
5582	3.7467898	5619	3.7496590	5656	3.7525094
5583	3.7468676	5620	3.7497363	5657	3.7525862
5584	3.7469454	5621	3.7498136	5658	3.7526629
5585	3.7470232	5622	3.7498908	5659	3.7527397
5586	3.7471009	5623	3.7499681	5660	3.7528164

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5661	3.7528932	5698	3.7557224	5735	3.7585334
5662	3.7529699	5699	3.7557987	5736	3.7586091
5663	3.7530466	5700	3.7558749	5737	3.7586848
5664	3.7531232	5701	3.7559510	5738	3.7587609
5665	3.7531999	5702	3.7560272	5739	3.7588362
5666	3.7532766	5703	3.7561034	5740	3.7589119
5667	3.7533532	5704	3.7561795	5741	3.7589875
5668	3.7534298	5705	3.7562556	5742	3.7590632
5669	3.7535065	5706	3.7563318	5743	3.7591388
5670	3.7535831	5707	3.7564079	5744	3.7592144
5671	3.7536596	5708	3.7564840	5745	3.7592900
5672	3.7537362	5709	3.7565600	5746	3.7593656
5673	3.7538128	5710	3.7566361	5747	3.7594412
5674	3.7538893	5711	3.7567122	5748	3.7595168
5675	3.7539659	5712	3.7567882	5749	3.7595923
5676	3.7540424	5713	3.7568642	5750	3.7596678
5677	3.7541189	5714	3.7569402	5751	3.7597434
5678	3.7541954	5715	3.7570162	5752	3.7598189
5679	3.7542719	5716	3.7570922	5753	3.7598944
5680	3.7543483	5717	3.7571682	5754	3.7599699
5681	3.7544248	5718	3.7572441	5755	3.7600453
5682	3.7545012	5719	3.7573201	5756	3.7601208
5683	3.7545777	5720	3.7573960	5757	3.7601961
5684	3.7546541	5721	3.7574719	5758	3.7602717
5685	3.7547305	5722	3.7575479	5759	3.7603471
5686	3.7548069	5723	3.7576237	5760	3.7604225
5687	3.7548832	5724	3.7576996	5761	3.7604979
5688	3.7549596	5725	3.7577755	5762	3.7605733
5689	3.7550359	5726	3.7578513	5763	3.7606486
5690	3.7551123	5727	3.7579272	5764	3.7607240
5691	3.7551886	5728	3.7580030	5765	3.7607993
5692	3.7552649	5729	3.7580788	5766	3.7608745
5693	3.7553412	5730	3.7581546	5767	3.7609500
5694	3.7554175	5731	3.7582304	5768	3.7610253
5695	3.7554937	5732	3.7583062	5769	3.7611005
5696	3.7555700	5733	3.7583819	5770	3.7611758
5697	3.7556462	5734	3.7584577	5771	3.7612511

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5772	3.7613263	5809	3.7641014	5846	3.7668588
5773	3.7614016	5810	3.7641761	5847	3.7669331
5774	3.7614768	5811	3.7642509	5848	3.7670074
5775	3.7615520	5812	3.7643256	5849	3.7670816
5776	3.7616272	5813	3.7644003	5850	3.7671559
5777	3.7617024	5814	3.7644750	5851	3.7672301
5778	3.7617775	5815	3.7645497	5852	3.7673043
5779	3.7618527	5816	3.7646244	5853	3.7673785
5780	3.7619278	5817	3.7646991	5854	3.7674527
5781	3.7620030	5818	3.7647737	5855	3.7675269
5782	3.7620781	5819	3.7648484	5856	3.7676011
5783	3.7621532	5820	3.7649230	5857	3.7676752
5784	3.7622283	5821	3.7649976	5858	3.7677494
5785	3.7623034	5822	3.7650722	5859	3.7678235
5786	3.7623784	5823	3.7651468	5860	3.7678976
5787	3.7624535	5824	3.7652214	5861	3.7679717
5788	3.7625285	5825	3.7652959	5862	3.7680458
5789	3.7626035	5826	3.7653705	5863	3.7681199
5790	3.7626786	5827	3.7654450	5864	3.7681940
5791	3.7627536	5828	3.7655195	5865	3.7682680
5792	3.7628286	5829	3.7655941	5866	3.7683421
5793	3.7629035	5830	3.7656686	5867	3.7684161
5794	3.7629785	5831	3.7657430	5868	3.7684901
5795	3.7630534	5832	3.7658175	5869	3.7685641
5796	3.7631284	5833	3.7658920	5870	3.7686381
5797	3.7632033	5834	3.7659664	5871	3.7687121
5798	3.7632782	5835	3.7660409	5872	3.7687860
5799	3.7633531	5836	3.7661153	5873	3.7688600
5800	3.7634280	5837	3.7661897	5874	3.7689339
5801	3.7635029	5838	3.7662641	5875	3.7690079
5802	3.7635777	5839	3.7663385	5876	3.7690818
5803	3.7636526	5840	3.7664128	5877	3.7691557
5804	3.7637274	5841	3.7664872	5878	3.7692296
5805	3.7638022	5842	3.7665616	5879	3.7693035
5806	3.7638770	5843	3.7666359	5880	3.7693773
5807	3.7639518	5844	3.7667102	5881	3.7694512
5808	3.7640266	5845	3.7667845	5882	3.7695250

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5883	3.7695988	5920	3.7723217	5957	3.7750276
5884	3.7696727	5921	3.7723951	5958	3.7751005
5885	3.7697465	5922	3.7724684	5959	3.7751734
5886	3.7698203	5923	3.7725417	5960	3.7752463
5887	3.7698940	5924	3.7726150	5961	3.7753191
5888	3.7699678	5925	3.7726884	5962	3.7753920
5889	3.7700416	5926	3.7727616	5963	3.7754648
5890	3.7701153	5927	3.7728349	5964	3.7755376
5891	3.7701890	5928	3.7729082	5965	3.7756104
5892	3.7702627	5929	3.7729814	5966	3.7756832
5893	3.7703364	5930	3.7730547	5967	3.7757560
5894	3.7704101	5931	3.7731279	5968	3.7758288
5895	3.7704838	5932	3.7732011	5969	3.7759016
5896	3.7705575	5933	3.7732743	5970	3.7759743
5897	3.7706311	5934	3.7733475	5971	3.7760471
5898	3.7707048	5935	3.7734207	5972	3.7761198
5899	3.7707784	5936	3.7734939	5973	3.7761925
5900	3.7708520	5937	3.7735670	5974	3.7762652
5901	3.7709256	5938	3.7736402	5975	3.7763379
5902	3.7709992	5939	3.7737133	5976	3.7764106
5903	3.7710728	5940	3.7737864	5977	3.7764833
5904	3.7711463	5941	3.7738596	5978	3.7765559
5905	3.7712199	5942	3.7739326	5979	3.7766286
5906	3.7712934	5943	3.7740057	5980	3.7767012
5907	3.7713670	5944	3.7740788	5981	3.7767738
5908	3.7714405	5945	3.7741519	5982	3.7768464
5909	3.7715140	5946	3.7742249	5983	3.7769190
5910	3.7715875	5947	3.7742979	5984	3.7769916
5911	3.7716610	5948	3.7743710	5985	3.7770642
5912	3.7717344	5949	3.7744440	5986	3.7771367
5913	3.7718079	5950	3.7745170	5987	3.7772093
5914	3.7718813	5951	3.7745899	5988	3.7772818
5915	3.7719547	5952	3.7746629	5989	3.7773543
5916	3.7720282	5953	3.7747359	5990	3.7774268
5917	3.7721016	5954	3.7748088	5991	3.7774993
5918	3.7721750	5955	3.7748818	5992	3.7775718
5919	3.7722483	5956	3.7749547	5993	3.7776443

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
5994	3.7777167	6031	3.7803893	6068	3.7830496
5995	3.7777892	6032	3.7804613	6069	3.7831171
5996	3.7778616	6033	3.7805333	6070	3.7831887
5997	3.7779340	6034	3.7806053	6071	3.7832602
5998	3.7780065	6035	3.7806773	6072	3.7833318
5999	3.7780789	6036	3.7807492	6073	3.7834033
6000	3.7781512	6037	3.7808212	6074	3.7834748
6001	3.7782236	6038	3.7808931	6075	3.7835463
6002	3.7782960	6039	3.7809650	6076	3.7836178
6003	3.7783683	6040	3.7810369	6077	3.7836892
6004	3.7784407	6041	3.7811088	6078	3.7837607
6005	3.7785130	6042	3.7811807	6079	3.7838321
6006	3.7785853	6043	3.7812526	6080	3.7839036
6007	3.7786576	6044	3.7813245	6081	3.7839750
6008	3.7787299	6045	3.7813963	6082	3.7840464
6009	3.7788022	6046	3.7814681	6083	3.7841178
6010	3.7788745	6047	3.7815400	6084	3.7841892
6011	3.7789467	6048	3.7816118	6085	3.7842606
6012	3.7790190	6049	3.7816836	6086	3.7843319
6013	3.7790912	6050	3.7817554	6087	3.7844033
6014	3.7791634	6051	3.7818272	6088	3.7844746
6015	3.7792356	6052	3.7818989	6089	3.7845460
6016	3.7793078	6053	3.7819707	6090	3.7846173
6017	3.7793800	6054	3.7820424	6091	3.7846886
6018	3.7794522	6055	3.7821141	6092	3.7847599
6019	3.7795243	6056	3.7821859	6093	3.7848312
6020	3.7795965	6057	3.7822576	6094	3.7849024
6021	3.7796686	6058	3.7823293	6095	3.7849737
6022	3.7797408	6059	3.7824010	6096	3.7850450
6023	3.7798129	6060	3.7824726	6097	3.7851162
6024	3.7798850	6061	3.7825443	6098	3.7851874
6025	3.7799571	6062	3.7826159	6099	3.7852586
6026	3.7800291	6063	3.7826876	6100	3.7853298
6027	3.7801012	6064	3.7827592	6101	3.7854010
6028	3.7801732	6065	3.7828308	6102	3.7854722
6029	3.7802453	6066	3.7829024	6103	3.7855434
6030	3.7803173	6067	3.7829740	6104	3.7856145

Num. Logarithm.	Num. Logarithm.	Num. Logarithm.
6105 3.7856857	6142 3.7883098	6179 3.7909122
6106 3.7857568	6143 3.7883805	6180 3.7909885
6107 3.7858279	6144 3.7884512	6181 3.7910587
6108 3.7858990	6145 3.7885219	6182 3.7911290
6109 3.7859701	6146 3.7885926	6183 3.7911992
6110 3.7860412	6147 3.7886632	6184 3.7912695
6111 3.7861123	6148 3.7887339	6185 3.7913397
6112 3.7861833	6149 3.7888045	6186 3.7914099
6113 3.7862544	6150 3.7888751	6187 3.7914801
6114 3.7863254	6151 3.7889457	6188 3.7915503
6115 3.7863965	6152 3.7890163	6189 3.7916205
6116 3.7864675	6153 3.7890869	6190 3.7916906
6117 3.7865385	6154 3.7891575	6191 3.7917608
6118 3.7866095	6155 3.7892281	6192 3.7918309
6119 3.7866805	6156 3.7892986	6193 3.7919011
6120 3.7867514	6157 3.7893691	6194 3.7919712
6121 3.7868224	6158 3.7894397	6195 3.7920413
6122 3.7868933	6159 3.7895102	6196 3.7921114
6123 3.7869643	6160 3.7895807	6197 3.7921815
6124 3.7870352	6161 3.7896512	6198 3.7922516
6125 3.7871061	6162 3.7897217	6199 3.7923216
6226 3.7871770	6163 3.7897922	6200 3.7923917
6127 3.7872479	6164 3.7898626	6201 3.7924617
6128 3.7873188	6165 3.7899331	6202 3.7925318
6129 3.7873896	6166 3.7900035	6203 3.7926018
6130 3.7874605	6167 3.7900739	6204 3.7926718
6131 3.7875313	6168 3.7901444	6205 3.7927418
6132 3.7876021	6169 3.7902148	6206 3.7928118
6133 3.7876730	6170 3.7902852	6207 3.7928817
6134 3.7877438	6171 3.7903555	6208 3.7929517
6135 3.7878146	6172 3.7904259	6209 3.7930217
6136 3.7878853	6173 3.7904963	6210 3.7930916
6137 3.7879561	6174 3.7905666	6211 3.7931615
6138 3.7880269	6175 3.7906370	6212 3.7932314
6139 3.7880976	6176 3.7907073	6213 3.7933014
6140 3.7881684	6177 3.7907776	6214 3.7933712
6141 3.7882391	6178 3.7908479	6215 3.7934411

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6216	3.7935110	6253	3.7960884	6290	3.7986506
6217	3.7935809	6254	3.7961579	6291	3.7987197
6218	3.7939507	6255	3.7962273	6292	3.7987887
6219	3.7937206	6256	3.7962967	6293	3.7988577
6220	3.7937904	6257	3.7963662	6294	3.7989267
6221	3.7938602	6258	3.7964356	6295	3.7989957
6222	3.7939300	6259	3.7965050	6296	3.7990647
6223	3.7939998	6260	3.7965743	6297	3.7991337
6224	3.7940696	6261	3.7966437	6298	3.7992027
6225	3.7941394	6262	3.7967131	6299	3.7992716
6226	3.7942091	6263	3.7967824	6300	3.7993405
6227	3.7942789	6264	3.7968517	6301	3.7994095
6228	3.7943486	6265	3.7969211	6302	3.7994784
6229	3.7944183	6266	3.7969904	6303	3.7995473
6230	3.7944880	6267	3.7970597	6304	3.7996163
6231	3.7945578	6268	3.7971290	6305	3.7996851
6232	3.7946274	6269	3.7971983	6306	3.7997540
6233	3.7946971	6270	3.7972675	6307	3.7998228
6234	3.7947668	6271	3.7973368	6308	3.7998917
6235	3.7948365	6272	3.7974060	6309	3.7999605
6236	3.7949061	6273	3.7974753	6310	3.8000294
6237	3.7949757	6274	3.7975445	6311	3.8000982
6238	3.7950454	6275	3.7976137	6312	3.8001670
6239	3.7951150	6276	3.7976829	6313	3.8002358
6240	3.7951846	6277	3.7977521	6314	3.8003046
6241	3.7952542	6278	3.7978213	6315	3.8003734
6242	3.7953238	6279	3.7978905	6316	3.8004421
6243	3.7953933	6280	3.7979596	6317	3.8005109
6244	3.7954629	6281	3.7980288	6318	3.8005796
6245	3.7955324	6282	3.7980979	6319	3.8006484
6246	3.7956020	6283	3.7981671	6320	3.8007171
6247	3.7956715	6284	3.7982362	6321	3.8007858
6248	3.7957410	6285	3.7983053	6322	3.8008545
6249	3.7958105	6286	3.7983744	6323	3.8009232
6250	3.7958800	6287	3.7984435	6324	3.8009919
6251	3.7959495	6288	3.7985125	6325	3.8010605
6252	3.7960190	6289	3.7985816	6326	3.8011292

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6327	3.8011978	6364	3.8037302	6401	3.8062478
6328	3.8012665	6365	3.8037984	6402	3.8063157
6329	3.8013351	6366	3.8038666	6403	3.8063835
6330	3.8014037	6367	3.8039348	6404	3.8064513
6331	3.8014723	6368	3.8040031	6405	3.8065191
6332	3.8015409	6369	3.8040712	6406	3.8065869
6333	3.8016095	6370	3.8041394	6407	3.8066547
6334	3.8016781	6371	3.8042076	6408	3.8067225
6335	3.8017466	6372	3.8042758	6409	3.8067903
6336	3.8018152	6373	3.8043439	6410	3.8068580
6337	3.8018837	6374	3.8044121	6411	3.8069258
6338	3.8019522	6375	3.8044802	6412	3.8069935
6339	3.8020208	6376	3.8045483	6413	3.8070612
6340	3.8020893	6377	3.8046164	6414	3.8071290
6341	3.8021578	6378	3.8046845	6415	3.8071967
6342	3.8022262	6379	3.8047526	6416	3.8072644
6343	3.8022947	6380	3.8048207	6417	3.8073320
6344	3.8023632	6381	3.8048887	6418	3.8073997
9345	3.8024316	6382	3.8049568	6419	3.8074674
9346	3.8025001	6383	3.8050248	6420	3.8075350
9347	3.8025685	6384	3.8050929	6421	3.8076027
9348	3.8026369	6385	3.8051609	6422	3.8076703
9349	3.8027053	6386	3.8052289	6423	3.8077379
9350	3.8027737	6387	3.8052969	6424	3.8078055
6351	3.8028421	6388	3.8053649	6425	3.8078731
6352	3.8029105	6389	3.8054329	6426	3.8079407
6353	3.8029789	6390	3.8055009	6427	3.8080083
6354	3.8030472	6391	3.8055688	6428	3.8080759
6355	3.8031156	6392	3.8056368	6429	3.8081434
6356	3.8031839	6393	3.8057047	6430	3.8082110
9357	3.8032522	6394	3.8057726	6431	3.8082785
9358	3.8033205	6395	3.8058405	6432	3.8083460
9359	3.8033888	6396	3.8059085	6433	3.8084136
9360	3.8034571	6397	3.8059763	6434	3.8084811
9361	3.8035254	6398	3.8060442	6435	3.8085485
9362	3.8035937	6399	3.8061121	6436	3.8086160
9363	3.8036619	6400	3.8061800	6437	3.8086835

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6438	3.8087510	6475	3.8112398	6512	3.8137144
6439	3.8088184	6476	3.8113068	6513	3.8137811
6440	3.8088859	6477	3.8113739	6514	3.8138478
6441	3.8089533	6478	3.8114409	6515	3.8139144
6442	3.8090207	6479	3.8115080	6516	3.8139811
6443	3.8090881	6480	3.8115750	6517	3.8140477
6444	3.8091555	6481	3.8116420	6518	3.8141144
6445	3.8092229	6482	3.8117090	6519	3.8141810
6446	3.8092903	6483	3.8117760	6520	3.8142476
6447	3.8093577	6484	3.8118430	6521	3.8143142
6448	3.8094250	6485	3.8119100	6522	3.8143808
6449	3.8094924	6486	3.8119769	6523	3.8144474
6450	3.8095597	6487	3.8120439	6524	3.8145140
6451	3.8096270	6488	3.8121108	6525	3.8145805
6452	3.8096944	6489	3.8121778	6526	3.8146471
6453	3.8097617	6490	3.8122447	6527	3.8147136
6454	3.8098290	6491	3.8123116	6528	3.8147801
6455	3.8098962	6492	3.8123785	6529	3.8148467
6456	3.8099635	6493	3.8124454	6530	3.8149132
6457	3.8100308	6494	3.8125123	6531	3.8149797
6458	3.8100980	6495	3.8125792	6532	3.8150462
6459	3.8101653	6496	3.8126460	6533	3.8151127
6460	3.8102325	6497	3.8127129	6534	3.8151791
6461	3.8102997	6498	3.8127797	6535	3.8152456
6462	3.8103670	6499	3.8128465	6536	3.8153120
6463	3.8104342	6500	3.8129134	6537	3.8153785
6464	3.8105013	6501	3.8129802	6538	3.8154449
6465	3.8105685	6502	3.8130470	6539	3.8155113
6466	3.8106357	6503	3.8131138	6540	3.8155777
6467	3.8107029	6504	3.8131805	6541	3.8156441
6468	3.8107700	6505	3.8132473	6542	3.8157105
6469	3.8108371	6506	3.8133141	6543	3.8157769
6470	3.8109043	6507	3.8133808	6544	3.8158433
6471	3.8109714	6508	3.8134475	6545	3.8159096
6472	3.8110385	6509	3.8135143	6546	3.8159760
6473	3.8111056	6510	3.8135810	6547	3.8160423
6474	3.8111727	6511	3.8136477	6548	3.8161087

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6549	3.8161750	6586	3.8186217	6623	3.8210548
6550	3.8162413	6587	3.8186877	6624	3.8211203
6551	3.8163076	6588	3.8187536	6625	3.8211855
6552	3.8163739	6589	3.8188195	6626	3.8212514
6553	3.8164402	6590	3.8188854	6627	3.8213170
6554	3.8165064	6591	3.8189513	6628	3.8213825
6555	3.8165727	6592	3.8190172	6629	3.8214480
6556	3.8166389	6593	3.8190831	6630	3.8215135
6557	3.8167052	6594	3.8191489	6631	3.8215790
6558	3.8167714	6595	3.8192148	6632	3.8216445
6559	3.8168376	6596	3.8192806	6633	3.8217100
6560	3.8169038	6597	3.8193465	6634	3.8217755
6561	3.8169700	6598	3.8194123	6635	3.8218409
6562	3.8170362	6599	3.8194781	6636	3.8219064
6563	3.8171024	6600	3.8195439	6637	3.8219718
6564	3.8171686	6601	3.8196097	6638	3.8220372
6565	3.8172347	6602	3.8196755	6639	3.8221027
6566	3.8173009	6603	3.8197413	6640	3.8221681
6567	3.8173670	6604	3.8198071	6641	3.8222335
6568	3.8174331	6605	3.8198728	6642	3.8222989
6569	3.8174993	6606	3.8199386	6643	3.8223643
6570	3.8175654	6607	3.8200043	6644	3.8224296
6571	3.8176315	6608	3.8200700	6645	3.8224950
6572	3.8176976	6609	3.8201358	6646	3.8225603
6573	3.8177636	6610	3.8202015	6647	3.8226257
6574	3.8178297	6611	3.8202672	6648	3.8226910
6575	3.8178958	6612	3.8203328	6649	3.8227563
6576	3.8179618	6613	3.8203985	6650	3.8228216
6577	3.8180278	6614	3.8204642	6651	3.8228869
6578	3.8180939	6615	3.8205298	6652	3.8229522
6579	3.8181599	6616	3.8205955	6653	3.8230175
6580	3.8182259	6617	3.8206611	6654	3.8230828
6581	3.8182919	6618	3.8207268	6655	3.8231481
6582	3.8183579	6619	3.8207924	6656	3.8232133
6583	3.8184239	6620	3.8208580	6657	3.8232786
6584	3.8184898	6621	3.8209236	6658	3.8233438
6585	3.8185558	6622	3.8209892	6659	3.8234090

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6650	3.8234742	6697	3.8258803	6734	3.8282731
6661	3.8235394	6698	3.8259451	6735	3.8283376
6662	3.8236046	6699	3.8260100	6736	3.8284021
6663	3.8236698	6700	3.8260748	6737	3.8284665
6664	3.8237350	6701	3.8261396	6738	3.8285310
6665	3.8238002	6702	3.8262044	6739	3.8285955
6666	3.8238653	6703	3.8262692	6740	3.8286599
6667	3.8239305	6704	3.8263340	6741	3.8287243
6668	3.8239956	6705	3.8263988	6742	3.8287887
6669	3.8240607	6706	3.8264635	6743	3.8288531
6670	3.8241258	6707	3.8265283	6744	3.8289176
6671	3.8241909	6708	3.8265931	6745	3.8289820
6672	3.8242560	6709	3.8266578	6746	3.8290463
6673	3.8243211	6710	3.8267225	6747	3.8291107
6674	3.8243862	6711	3.8267872	6748	3.8291751
6675	3.8244513	6712	3.8268519	6749	3.8292394
6676	3.8245163	6713	3.8269166	6750	3.8293038
6677	3.8245814	6714	3.8269813	6751	3.8293681
6678	3.8246464	6715	3.8270460	6752	3.8294324
6679	3.8247114	6716	3.8271107	6753	3.8294967
6680	3.8247765	6717	3.8271753	6754	3.8295611
6681	3.8248415	6718	3.8272400	6755	3.8296254
6682	3.8249065	6719	3.8273046	6756	3.8296896
6683	3.8249715	6720	3.8273693	6757	3.8297539
6684	3.8250364	6721	3.8274339	6758	3.8298182
6685	3.8251014	6722	3.8274985	6759	3.8298824
6686	3.8251664	6723	3.8275631	6760	3.8299467
6687	3.8252313	6724	3.8276277	6761	3.8300109
6688	3.8252963	6725	3.8276923	6762	3.8300752
6689	3.8253612	6726	3.8277569	6763	3.8301394
6690	3.8254261	6727	3.8278214	6764	3.8302036
6691	3.8254910	6728	3.8278860	6765	3.8302678
6692	3.8255559	6729	3.8279505	6766	3.8303320
6693	3.8256208	6730	3.8280151	6767	3.8303962
6694	3.8256857	6731	3.8280796	6768	3.8304603
6695	3.8257506	6732	3.8281441	6769	3.8305245
6696	3.8258154	6733	3.8282086	6770	3.8305887

Nam.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6771	3.8306528	6808	3.8330195	6845	3.8353735
6772	3.8307169	6809	3.8330833	6846	3.8354369
6773	3.8307811	6810	3.8331471	6847	3.8355003
6774	3.8308452	6811	3.8332109	6848	3.8355638
6775	3.8309093	6812	3.8332746	6849	3.8356272
6776	3.8309734	6813	3.8333384	6850	3.8356906
6777	3.8310375	6814	3.8334021	6851	3.8357540
6778	3.8311016	6815	3.8334659	6852	3.8358174
6779	3.8311656	6816	3.8335296	6853	3.8358807
6780	3.8312297	6817	3.8335933	6854	3.8359441
6781	3.8312937	6818	3.8336570	6855	3.8360075
6782	3.8313578	6819	3.8337207	6856	3.8360708
6783	3.8314218	6820	3.8337844	6857	3.8361341
6784	3.8314858	6821	3.8338480	6858	3.8361974
6785	3.8315499	6822	3.8339117	6859	3.8362608
6786	3.8316139	6823	3.8339754	6860	3.8363241
6787	3.8316778	6824	3.8340390	6861	3.8363874
6788	3.8317418	6825	3.8341027	6862	3.8364507
6789	3.8318058	6826	3.8341663	6863	3.8365140
6790	3.8318698	6827	3.8342299	6864	3.8365773
6791	3.8319337	6828	3.8342935	6865	3.8366405
6792	3.8319977	6829	3.8343571	6866	3.8367038
6793	3.8320616	6830	3.8344207	6867	3.8367670
6794	3.8321255	6831	3.8344843	6868	3.8368301
6795	3.8321895	6832	3.8345479	6869	3.8368935
6796	3.8322534	6833	3.8346114	6870	3.8369567
6797	3.8323173	6834	3.8346750	6871	3.8370199
6798	3.8323812	6835	3.8347385	6872	3.8370832
6799	3.8324450	6836	3.8348021	6873	3.8371463
6800	3.8325089	6837	3.8348656	6874	3.8372095
6801	3.8325728	6838	3.8349291	6875	3.8372727
6802	3.8326366	6839	3.8349926	6876	3.8373359
6803	3.8327005	6840	3.8350561	6877	3.8373990
6804	3.8327643	6841	3.8351196	6878	3.8374622
6805	3.8328281	6842	3.8351831	6879	3.8375253
6806	3.8328919	6843	3.8352465	6880	3.8375884
6807	3.8329558	6844	3.8353100	6881	3.8376516

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6882	3.8377147	6919	3.8400433	6956	3.8423596
6883	3.8377778	6920	3.8401061	6957	3.8424220
6884	3.8378409	6921	3.8401688	6958	3.8424844
6885	3.8379039	6922	3.8402316	6959	3.8425468
6886	3.8379670	6923	3.8402943	6960	3.8426092
6887	3.8380301	6924	3.8403571	6961	3.8426716
6888	3.8380931	6925	3.8404198	6962	3.8427340
6889	3.8381562	6926	3.8404825	6963	3.8427964
6890	3.8382192	6927	3.8405452	6964	3.8428588
6891	3.8382822	6928	3.8406079	6965	3.8429211
6892	3.8383453	6929	3.8406706	6966	3.8429835
6893	3.8384083	6930	3.8407332	6967	3.8430458
6894	3.8384713	6931	3.8407959	6968	3.8431081
6895	3.8385343	6932	3.8408586	6969	3.8431705
6896	3.8385973	6933	3.8409212	6970	3.8432328
6897	3.8386602	6934	3.8409838	6971	3.8432951
6898	3.8387232	6935	3.8410465	6972	3.8433574
6899	3.8387861	6936	3.8411091	6973	3.8434197
6900	3.8388491	6937	3.8411717	6974	3.8434819
6901	3.8389120	6938	3.8412343	6975	3.8435442
6902	3.8389750	6939	3.8412969	6976	3.8436065
6903	3.8390379	6940	3.8413595	6977	3.8436687
6904	3.8391008	6941	3.8414220	6978	3.8437310
6905	3.8391637	6942	3.8414846	6979	3.8437932
6906	3.8392266	6943	3.8415472	6980	3.8438554
6907	3.8392895	6944	3.8416097	6981	3.8439176
6908	3.8393523	6945	3.8416722	6982	3.8439798
6909	3.8394152	6946	3.8417348	6983	3.8440420
6910	3.8394780	6947	3.8417973	6984	3.8441042
6911	3.8395409	6948	3.8418598	6985	3.8441664
6912	3.8396037	6949	3.8419223	6986	3.8442286
6913	3.8396666	6950	3.8419848	6987	3.8442907
6914	3.8397294	6951	3.8420473	6988	3.8443529
6915	3.8397922	6952	3.8421098	6989	3.8444150
6916	3.8398550	6953	3.8421722	6990	3.8444772
6917	3.8399178	6954	3.8422347	6991	3.8445393
6918	3.8399806	6955	3.8422971	6992	3.8446014

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
6993	3.8446635	7030	3.8469553	7067	3.8492351
6994	3.8447256	7031	3.8470171	7068	3.8492969
6995	3.8447877	7032	3.8470789	7069	3.8493580
6996	3.8448498	7033	3.8471406	7070	3.8494194
6997	3.8449119	7034	3.8472024	7071	3.8494806
6998	3.8449739	7035	3.8472641	7072	3.8495423
6999	3.8450360	7036	3.8473258	7073	3.8496037
7000	3.8450980	7037	3.8473876	7074	3.8496651
7001	3.8451601	7038	3.8474493	7075	3.8497264
7002	3.8452221	7039	3.8475110	7076	3.8497878
7003	3.8452841	7040	3.8475727	7077	3.8498493
7004	3.8453461	7041	3.8476343	7078	3.8499106
7005	3.8454081	7042	3.8476960	7079	3.8499719
7006	3.8454701	7043	3.8477577	7080	3.8500333
7007	3.8455321	7044	3.8478193	7081	3.8500946
7008	3.8455941	7045	3.8478810	7082	3.8501559
7009	3.8456561	7046	3.8479426	7083	3.8502174
7010	3.8457180	7047	3.8480043	7084	3.8502786
7011	3.8457800	7048	3.8480659	7085	3.8503399
7012	3.8458419	7049	3.8481275	7086	3.8504011
7013	3.8459038	7050	3.8481891	7087	3.8504624
7014	3.8459658	7051	3.8482507	7088	3.8505237
7015	3.8460277	7052	3.8483123	7089	3.8505849
7016	3.8460896	7053	3.8483739	7090	3.8506461
7017	3.8461515	7054	3.8484355	7091	3.8507073
7018	3.8462134	7055	3.8484970	7092	3.8507687
7019	3.8462752	7056	3.8485586	7093	3.8508299
7020	3.8463371	7057	3.8486201	7094	3.8508912
7021	3.8463990	7058	3.8486817	7095	3.8509524
7022	3.8464608	7059	3.8487432	7096	3.8510137
7023	3.8465227	7060	3.8488047	7097	3.8510749
7024	3.8465845	7061	3.8488662	7098	3.8511360
7025	3.8466463	7062	3.8489277	7099	3.8511972
7026	3.8467081	7063	3.8489892	7100	3.8512584
7027	3.8467700	7064	3.8490507	7101	3.8513195
7028	3.8468318	7065	3.8491123	7102	3.8513807
7029	3.8468935	7066	3.8491736	7103	3.8514418

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7104	3.8515030	7141	3.8557590	7178	3.8560035
7105	3.8515641	7142	3.8558198	7179	3.8560640
7106	3.8516252	7143	3.8558806	7180	3.8561244
7107	3.8516863	7144	3.8559414	7181	3.8561849
7108	3.8517474	7145	3.8560022	7182	3.8562454
7109	3.8518085	7146	3.8560630	7183	3.8563059
7110	3.8518696	7147	3.8561238	7184	3.8563663
7111	3.8519307	7148	3.8561845	7185	3.8564268
7112	3.8519917	7149	3.8562453	7186	3.8564872
7113	3.8520528	7150	3.8563060	7187	3.8565476
7114	3.8521139	7151	3.8563668	7188	3.8566081
7115	3.8521749	7152	3.8564275	7189	3.8566685
7116	3.8522359	7153	3.8564882	7190	3.8567289
7117	3.8522970	7154	3.8565489	7191	3.8567893
7118	3.8523580	7155	3.8566096	7192	3.8568497
7119	3.8524190	7156	3.8566703	7193	3.8569101
7120	3.8524800	7157	3.8567310	7194	3.8569704
7121	3.8525410	7158	3.8567917	7195	3.8570308
7122	3.8526020	7159	3.8568524	7196	3.8570912
7123	3.8526629	7160	3.8569130	7197	3.8571515
7124	3.8527239	7161	3.8569737	7198	3.8572118
7125	3.8527849	7162	3.8570343	7199	3.8572722
7126	3.8528458	7163	3.8570949	7200	3.8573325
7127	3.8529068	7164	3.8571556	7201	3.8573928
7128	3.8529677	7165	3.8572162	7202	3.8574531
7129	3.8530286	7166	3.8572768	7203	3.8575134
7130	3.8530895	7167	3.8573374	7204	3.8575737
7131	3.8531504	7168	3.8573980	7205	3.8576340
7132	3.8532113	7169	3.8574586	7206	3.8576943
7133	3.8532722	7170	3.8575192	7207	3.8577545
7134	3.8533331	7171	3.8575797	7208	3.8578148
7135	3.8533940	7172	3.8576403	7209	3.8578750
7136	3.8534548	7173	3.8577008	7210	3.8579353
7137	3.8535157	7174	3.8577614	7211	3.8579955
7138	3.8535765	7175	3.8578219	7212	3.8580557
7139	3.8536374	7176	3.8578824	7213	3.8581159
7140	3.8536982	7177	3.8579429	7214	3.8581761

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7215	3.8582363	7252	3.8604578	7289	3.8626679	7326	3.8648780
7216	3.8582965	7253	3.8605177	7290	3.8627275	7327	3.8649381
7217	3.8583567	7254	3.8605776	7291	3.8627871	7328	3.8649982
7218	3.8584169	7255	3.8606374	7292	3.8628467	7329	3.8650583
7219	3.8584770	7256	3.8606973	7293	3.8629062	7330	3.8651184
7220	3.8585372	7257	3.8607571	7294	3.8629658	7331	3.8651785
7221	3.8585973	7258	3.8608170	7295	3.8630253	7332	3.8652386
7222	3.8586575	7259	3.8608768	7296	3.8630848	7333	3.8652987
7223	3.8587176	7260	3.8609366	7297	3.8631443	7334	3.8653588
7224	3.8587777	7261	3.8609964	7298	3.8632039	7335	3.8654189
7225	3.8588379	7262	3.8610562	7299	3.8632634	7336	3.8654790
7226	3.8588980	7263	3.8611160	7300	3.8633229	7337	3.8655391
7227	3.8589581	7264	3.8611758	7301	3.8633823	7338	3.8655992
7228	3.8590181	7265	3.8612356	7302	3.8634418	7339	3.8656593
7229	3.8590782	7266	3.8612954	7303	3.8635013	7340	3.8657194
7230	3.8591383	7267	3.8613552	7304	3.8635608	7341	3.8657795
7231	3.8591984	7268	3.8614149	7305	3.8636203	7342	3.8658396
7232	3.8592584	7269	3.8614747	7306	3.8636797	7343	3.8658997
7233	3.8593185	7270	3.8615344	7307	3.8637391	7344	3.8659598
7234	3.8593785	7271	3.8615941	7308	3.8637985	7345	3.8660199
7235	3.8594385	7272	3.8616539	7309	3.8638580	7346	3.8660800
7236	3.8594986	7273	3.8617136	7310	3.8639174	7347	3.8661401
7237	3.8595586	7274	3.8617733	7311	3.8639768	7348	3.8662002
7238	3.8596186	7275	3.8618330	7312	3.8640362	7349	3.8662603
7239	3.8596786	7276	3.8618927	7313	3.8640956	7350	3.8663204
7240	3.8597386	7277	3.8619524	7314	3.8641550	7351	3.8663805
7241	3.8597985	7278	3.8620120	7315	3.8642143	7352	3.8664406
7242	3.8598585	7279	3.8620717	7316	3.8642737	7353	3.8665007
7243	3.8599185	7280	3.8621314	7317	3.8643331	7354	3.8665608
7244	3.8599784	7281	3.8621910	7318	3.8643924	7355	3.8666209
7245	3.8600384	7282	3.8622507	7319	3.8644517	7356	3.8666810
7246	3.8600983	7283	3.8623103	7320	3.8645111	7357	3.8667411
7247	3.8601583	7284	3.8623699	7321	3.8645704	7358	3.8668012
7248	3.8602182	7285	3.8624296	7322	3.8646297	7359	3.8668613
7249	3.8602781	7286	3.8624892	7323	3.8646890	7360	3.8669214
7250	3.8603380	7287	3.8625488	7324	3.8647483	7361	3.8669815
7251	3.8603979	7288	3.8626084	7325	3.8648076	7362	3.8670416

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7326	3.8648669	7363	3.8670548	7400	3.8692317
7327	3.8649262	7364	3.8671138	7401	3.8692904
7328	3.8649855	7365	3.8671728	7402	3.8693491
7329	3.8650447	7366	3.8672317	7403	3.8694077
7330	3.8651040	7367	3.8672907	7404	3.8694664
7331	3.8651632	7368	3.8673496	7405	3.8695251
7332	3.8652225	7369	3.8674086	7406	3.8695837
7333	3.8652817	7370	3.8674675	7407	3.8696423
7334	3.8653409	7371	3.8675264	7408	3.8697010
7335	3.8654001	7372	3.8675853	7409	3.8697596
7336	3.8654593	7373	3.8676442	7410	3.8698182
7337	3.8655185	7374	3.8677031	7411	3.8698768
7338	3.8655777	7375	3.8677620	7412	3.8699354
7339	3.8656369	7376	3.8678209	7413	3.8699940
7340	3.8656961	7377	3.8678798	7414	3.8700526
7341	3.8657552	7378	3.8679387	7415	3.8701112
7342	3.8658144	7379	3.8679975	7416	3.8701697
7343	3.8658735	7380	3.8680564	7417	3.8702283
7344	3.8659327	7381	3.8681152	7418	3.8702868
7345	3.8659918	7382	3.8681740	7419	3.8703454
7346	3.8660509	7383	3.8682329	7420	3.8704039
7347	3.8661100	7384	3.8682917	7421	3.8704624
7348	3.8661691	7385	3.8683505	7422	3.8705209
7349	3.8662282	7386	3.8684093	7423	3.8705795
7350	3.8662873	7387	3.8684681	7424	3.8706380
7351	3.8663464	7388	3.8685269	7425	3.8706965
7352	3.8664055	7389	3.8685857	7426	3.8707549
7353	3.8664646	7390	3.8686444	7427	3.8708134
7354	3.8665236	7391	3.8687032	7428	3.8708719
7355	3.8665827	7392	3.8687620	7429	3.8709304
7356	3.8666417	7393	3.8688207	7430	3.8709888
7357	3.8667008	7394	3.8688794	7431	3.8710473
7358	3.8667598	7395	3.8689382	7432	3.8711057
7359	3.8668188	7396	3.8689969	7433	3.8711641
7360	3.8668778	7397	3.8690556	7434	3.8712226
7361	3.8669368	7398	3.8691143	7435	3.8712810
7362	3.8669958	7399	3.8691730	7436	3.8713394

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7437	3.8713978	7474	3.8735531	7511	3.8756978
7438	3.8714562	7475	3.8736112	7512	3.8757568
7439	3.8715146	7476	3.8736693	7513	3.8758134
7440	3.8715729	7477	3.8737274	7514	3.8758712
7441	3.8716313	7478	3.8737855	7515	3.8759290
7442	3.8716897	7479	3.8738435	7516	3.8759868
7443	3.8717480	7480	3.8739016	7517	3.8760445
7444	3.8718064	7481	3.8739597	7518	3.8761023
7445	3.8718647	7482	3.8740177	7519	3.8761601
7446	3.8719230	7483	3.8740757	7520	3.8762178
7447	3.8719814	7484	3.8741338	7521	3.8762756
7448	3.8720397	7485	3.8741918	7522	3.8763333
7449	3.8720980	7486	3.8742498	7523	3.8763911
7450	3.8721563	7487	3.8743078	7524	3.8764488
7451	3.8722146	7488	3.8743653	7525	3.8765065
7452	3.8722728	7489	3.8744238	7526	3.8765642
7453	3.8723311	7490	3.8744818	7527	3.8766219
7454	3.8723894	7491	3.8745398	7528	3.8766796
7455	3.8724476	7492	3.8745978	7529	3.8767373
7456	3.8725059	7493	3.8746557	7530	3.8767950
7457	3.8725641	7494	3.8747137	7531	3.8768526
7458	3.8726224	7495	3.8747716	7532	3.8769103
7459	3.8726806	7496	3.8748296	7533	3.8769680
7460	3.8727388	7497	3.8748875	7534	3.8770256
7461	3.8727970	7498	3.8749454	7535	3.8770833
7462	3.8728552	7499	3.8750034	7536	3.8771409
7463	3.8729134	7500	3.8750613	7537	3.8771985
7464	3.8729716	7501	3.8751192	7538	3.8772561
7465	3.8730298	7502	3.8751771	7539	3.8773137
7466	3.8730880	7503	3.8752349	7540	3.8773713
7467	3.8731461	7504	3.8752928	7541	3.8774289
7468	3.8732043	7505	3.8753507	7542	3.8774865
7469	3.8732625	7506	3.8754086	7543	3.8775441
7470	3.8733206	7507	3.8754664	7544	3.8776017
7471	3.8733787	7508	3.8755243	7545	3.8776592
7472	3.8734369	7509	3.8755821	7546	3.8777168
7473	3.8734950	7510	3.8756399	7547	3.8777743

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7548	3.8778319	7585	3.8799556	7622	3.8820689
7549	3.8778894	7586	3.8800128	7623	3.8821259
7550	3.8779469	7587	3.8800701	7624	3.8821829
7551	3.8780045	7588	3.8801273	7625	3.8822398
7552	3.8780620	7589	3.8801846	7626	3.8822968
7553	3.8781195	7590	3.8802418	7627	3.8823537
7554	3.8781770	7591	3.8802990	7628	3.8824107
7555	3.8782345	7592	3.8803562	7629	3.8824676
7556	3.8782919	7593	3.8804134	7630	3.8825245
7557	3.8783494	7594	3.8804706	7631	3.8825815
7558	3.8784069	7595	3.8805278	7632	3.8826384
7559	3.8784643	7596	3.8805850	7633	3.8826953
7560	3.8785218	7597	3.8806421	7634	3.8827522
7561	3.8785792	7598	3.8806993	7635	3.8828090
7562	3.8786367	7599	3.8807564	7636	3.8828659
7563	3.8786941	7600	3.8808136	7637	3.8829228
7564	3.8787515	7601	3.8808707	7638	3.8829797
7565	3.8788089	7602	3.8809279	7639	3.8830365
7566	3.8788663	7603	3.8809850	7640	3.8830934
7567	3.8789237	7604	3.8810421	7641	3.8831502
7568	3.8789811	7605	3.8810992	7642	3.8832070
7569	3.8790385	7606	3.8811563	7643	3.8832639
7570	3.8790959	7607	3.8812134	7644	3.8833207
7571	3.8791532	7608	3.8812705	7645	3.8833775
7572	3.8792106	7609	3.8813276	7646	3.8834343
7573	3.8792680	7610	3.8813847	7647	3.8834911
7574	3.8793253	7611	3.8814417	7648	3.8835479
7575	3.8793826	7612	3.8814988	7649	3.8836047
7576	3.8794400	7613	3.8815558	7650	3.8836614
7577	3.8794973	7614	3.8816129	7651	3.8837182
7578	3.8795546	7615	3.8816699	7652	3.8837750
7579	3.8796119	7616	3.8817269	7653	3.8838317
7580	3.8796692	7617	3.8817840	7654	3.8838885
7581	3.8797265	7618	3.8818410	7655	3.8839452
7582	3.8797838	7619	3.8818980	7656	3.8840019
7583	3.8798411	7620	3.8819550	7657	3.8840586
7584	3.8798983	7621	3.8820120	7658	3.8841154

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7659	3.8841721	7696	3.8862651	7733	3.8883480
7660	3.8842288	7697	3.8863215	7734	3.8884042
7661	3.8842855	7698	3.8863779	7735	3.8884603
7662	3.8843421	7699	3.8864343	7736	3.8885165
7663	3.8843988	7700	3.8864907	7737	3.8885726
7664	3.8844555	7701	3.8865471	7738	3.8886287
7665	3.8845122	7702	3.8866035	7739	3.8886848
7666	3.8845688	7703	3.8866599	7740	3.8887410
7667	3.8846255	7704	3.8867163	7741	3.8887971
7668	3.8846821	7705	3.8867726	7742	3.8888532
7669	3.8847387	7706	3.8868290	7743	3.8889093
7670	3.8847954	7707	3.8868854	7744	3.8889653
7671	3.8848520	7708	3.8869417	7745	3.8890214
7672	3.8849086	7709	3.8869980	7746	3.8890775
7673	3.8849652	7710	3.8870544	7747	3.8891336
7674	3.8850218	7711	3.8871107	7748	3.8891896
7675	3.8850784	7712	3.8871670	7749	3.8892457
7676	3.8851350	7713	3.8872233	7750	3.8893017
7677	3.8851915	7714	3.8872796	7751	3.8893577
7678	3.8852481	7715	3.8873359	7752	3.8894138
7679	3.8853047	7716	3.8873922	7753	3.8894698
7680	3.8853612	7717	3.8874485	7754	3.8895258
7681	3.8854178	7718	3.8875048	7755	3.8895818
7682	3.8854743	7719	3.8875610	7756	3.8896378
7683	3.8855308	7720	3.8876173	7757	3.8896938
7684	3.8855874	7721	3.8876736	7758	3.8897498
7685	3.8856439	7722	3.8877298	7759	3.8898058
7686	3.8857004	7723	3.8877860	7760	3.8898617
7687	3.8857569	7724	3.8878423	7761	3.8899177
7688	3.8858134	7725	3.8878985	7762	3.8899735
7689	3.8858699	7726	3.8879547	7763	3.8900296
7690	3.8859263	7727	3.8880109	7764	3.8900855
7691	3.8859828	7728	3.8880671	7765	3.8901415
7692	3.8860393	7729	3.8881233	7766	3.8901974
7693	3.8860957	7730	3.8881795	7767	3.8902533
7694	3.8861522	7731	3.8882357	7768	3.8903092
7695	3.8862085	7732	3.8882918	7769	3.8903651

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7770	3.8904210	7807	3.8924842	7844	3.8945376
7771	3.8904769	7808	3.8925398	7845	3.8945929
7772	3.8905328	7809	3.8925954	7846	3.8946483
7773	3.8905887	7810	3.8926510	7847	3.8947037
7774	3.8906445	7811	3.8927066	7848	3.8947590
7775	3.8907004	7812	3.8927622	7849	3.8948143
7776	3.8907563	7813	3.8928178	7850	3.8948697
7777	3.8908121	7814	3.8928734	7851	3.8949250
7778	3.8908679	7815	3.8929290	7852	3.8949803
7779	3.8909238	7816	3.8929846	7853	3.8950356
7780	3.8909796	7817	3.8930401	7854	3.8950909
7781	3.8910354	7818	3.8930957	7855	3.8951462
7782	3.8910912	7819	3.8931512	7856	3.8952015
7783	3.8911470	7820	3.8932068	7857	3.8952568
7784	3.8912028	7821	3.8932623	7858	3.8953120
7785	3.8912586	7822	3.8933178	7859	3.8953673
7786	3.8913144	7823	3.8933733	7860	3.8954225
7787	3.8913702	7824	3.8934288	7861	3.8954778
7788	3.8914259	7825	3.8934843	7862	3.8955330
7789	3.8914817	7826	3.8935398	7863	3.8955883
7790	3.8915375	7827	3.8935953	7864	3.8956435
7791	3.8915932	7828	3.8936508	7865	3.8956987
7792	3.8916489	7829	3.8937063	7866	3.8957539
7793	3.8917047	7830	3.8937618	7867	3.8958091
7794	3.8917604	7831	3.8938172	7868	3.8958643
7795	3.8918161	7832	3.8938727	7869	3.8959195
7796	3.8918718	7833	3.8939281	7870	3.8959747
7797	3.8919275	7834	3.8939836	7871	3.8960299
7798	3.8919832	7835	3.8940390	7872	3.8960851
7799	3.8920389	7836	3.8940944	7873	3.8961403
7800	3.8920946	7837	3.8941498	7874	3.8961954
7801	3.8921503	7838	3.8942053	7875	3.8962506
7802	3.8922059	7839	3.8942607	7876	3.8963057
7803	3.8922616	7840	3.8943161	7877	3.8963608
7804	3.8923173	7841	3.8943715	7878	3.8964160
7805	3.8923729	7842	3.8944268	7879	3.8964711
7806	3.8924285	7843	3.8944822	7880	3.8965262

<i>Num.</i>	<i>Logarithm.</i>	<i>Num.</i>	<i>Logarithm.</i>	<i>Num.</i>	<i>Logarithm.</i>
7881	3.8965813	7918	3.8986155	7955	3.9005402
7882	3.8966364	7919	3.8986703	7956	3.9005948
7883	3.8966915	7920	3.8987252	7957	3.9006494
7884	3.8967466	7921	3.8987800	7958	3.9007039
7885	3.8968017	7922	3.8988348	7959	3.9007585
7886	3.8968568	7923	3.8988897	7960	3.9008131
7887	3.8969118	7624	3.8829445	7961	3.9008676
7888	3.8969669	7925	3.8889993	7962	3.9009222
7889	3.8970220	7926	3.8990541	7963	3.9009767
7890	3.8970770	7927	3.8991089	7964	3.9010313
7891	3.8971320	7928	3.8991636	7965	3.9010858
7892	3.8971871	7929	3.8992184	7966	3.9011403
7893	3.8972421	7930	3.8992732	7967	3.9011948
7894	3.8972971	7931	3.8993279	7968	3.9012493
7895	3.8973521	7932	3.8993827	7969	3.9013038
7896	3.8974071	7933	3.8994375	7970	3.9013583
7897	3.8974621	7934	3.8994922	7971	3.9014128
7898	3.8975171	7935	3.8995469	7972	3.9014673
7899	3.8975721	7936	3.8996017	7973	3.9015218
7900	3.8976271	7937	3.8996564	7974	3.9015762
7901	3.8976821	7938	3.8997111	7975	3.9016307
7902	3.8977370	7939	3.8997658	7976	3.9016851
7903	3.8977920	7940	3.8998205	7977	3.9017396
7904	3.8978469	7941	3.8998752	7978	3.9017940
7905	3.8979019	7942	3.8999299	7979	3.9018485
7906	3.8979568	7943	3.8999846	7980	3.9019029
7907	3.8980117	7944	3.9000392	7981	3.9019573
7908	3.8980667	7945	3.9000939	7982	3.9020117
7909	3.8981216	7946	3.9001486	7983	3.9020661
7910	3.8981765	7947	3.9002032	7984	3.9021205
7911	3.8982314	7948	3.9002579	7985	3.9021749
7912	3.8982864	7949	3.9003125	7986	3.9022293
7913	3.8983412	7950	3.9003671	7987	3.9022837
7914	3.8983960	7951	3.9004218	7988	3.9023381
7915	3.8984509	7952	3.9004764	7989	3.9023924
7916	3.8985058	7953	3.9005310	7990	3.9024468
7917	3.8985506	7954	3.9005856	7991	3.9025011

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
7992	3.6026555	8029	3.9046615	8066	3.9066582
7993	3.6027098	8030	3.9047155	8067	3.9067121
7994	3.6027641	8031	3.9047696	8068	3.9067659
7995	3.6028185	8032	3.9048237	8069	3.9068197
7996	3.6028728	8033	3.9048778	8070	3.9068735
7997	3.6029271	8034	3.9049318	8071	3.9069273
7998	3.9029814	8035	3.9049859	8072	3.9069812
7999	3.9030357	8036	3.9050399	8073	3.9070350
8000	3.9030900	8037	3.9050940	8074	3.9070887
8001	3.9031443	8038	3.9051480	8075	3.9071425
8002	3.9031985	8039	3.9052020	8076	3.9071963
8003	3.9032528	8040	3.9052560	8077	3.9072501
8004	3.9033071	8041	3.9053101	8078	3.9073038
8005	3.9033613	8042	3.9053641	8079	3.9073576
8006	3.9034156	8043	3.9054181	8080	3.9074114
8007	3.9034698	8044	3.9054721	8081	3.9074651
8008	3.9035241	8045	3.9055260	8082	3.9075188
8009	3.9035783	8046	3.9055800	8083	3.9075726
8010	3.9036325	8047	3.9056340	8084	3.9076263
8011	3.9036867	8048	3.9056880	8085	3.9076800
8012	3.9037409	8049	3.9057419	8086	3.9077337
8013	3.9037951	8050	3.9057959	8087	3.9077874
8014	3.9038493	8051	3.9058498	8088	3.9078411
8015	3.9039035	8052	3.9059038	8089	3.9078948
8016	3.9039577	8053	3.9059577	8090	3.9079485
8017	3.9040119	8054	3.9060116	8091	3.9080022
8018	3.9040661	8055	3.9060655	8092	3.9080559
8019	3.9041202	8056	3.9061195	8093	3.9081095
8020	3.9041744	8057	3.9061734	8094	3.9081632
8021	3.9042285	8058	3.9062273	8095	3.9082169
8022	3.9042827	8059	3.9062812	8096	3.9082705
8023	3.9043368	8060	3.9063350	8097	3.9083241
8024	3.9043909	8061	3.9063889	8098	3.9083778
8025	3.9044450	8062	3.9064428	8099	3.9084314
8026	3.9044992	8063	3.9064967	8100	3.9084850
8027	3.9045533	8064	3.9065505	8101	3.9085386
8028	3.9046074	8065	3.9066044	8102	3.9085922

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8103	3.9086458	8140	3.9106244	8177	3.9125940
8104	3.9086994	8141	3.9106778	8178	3.9126471
8105	3.9087530	8142	3.9107311	8179	3.9127002
8106	3.9088066	8143	3.9107844	8180	3.9127533
8107	3.9088602	8144	3.9108378	8181	3.9128064
8108	3.9089137	8145	3.9108911	8182	3.9128595
8109	3.9089673	8146	3.9109444	8183	3.9129126
8110	3.9090209	8147	3.9109977	8184	3.9129656
8111	3.9090744	8148	3.9110510	8185	3.9130187
8112	3.9091279	8149	3.9111043	8186	3.9130717
8113	3.9091815	8150	3.9111576	8187	3.9131248
8114	3.9092350	8151	3.9112109	8188	3.9131778
8115	3.9092885	8152	3.9112642	8189	3.9132309
8116	3.9093420	8153	3.9113174	8190	3.9132839
8117	3.9093955	8154	3.9113707	8191	3.9133369
8118	3.9094490	8155	3.9114240	8192	3.9133899
8119	3.9095025	8156	3.9114772	8193	3.9134430
8120	3.9095560	8157	3.9115305	8194	3.9134960
8121	3.9096095	8158	3.9115837	8195	3.9135490
8122	3.9096630	8159	3.9116369	8196	3.9136019
8123	3.9097165	8160	3.9116902	8197	3.9136549
8124	3.9097699	8161	3.9117434	8198	3.9137079
8125	3.9098234	8162	3.9117966	8199	3.9137609
8126	3.9098768	8163	3.9118498	8200	3.9138139
8127	3.9099303	8164	3.9119030	8201	3.9138669
8128	3.9099837	8165	3.9119562	8202	3.9139199
8129	3.9100371	8166	3.9120094	8203	3.9139729
8130	3.9100905	8167	3.9120626	8204	3.9140259
8131	3.9101440	8168	3.9121157	8205	3.9140789
8132	3.9101974	8169	3.9121689	8206	3.9141319
8133	3.9102508	8170	3.9122221	8207	3.9141849
8134	3.9103042	8171	3.9122752	8208	3.9142379
8135	3.9103576	8172	3.9123284	8209	3.9142909
8136	3.9104109	8173	3.9123815	8210	3.9143439
8137	3.9104643	8174	3.9124346	8211	3.9143969
8138	3.9105177	8175	3.9124878	8212	3.9144499
8139	3.9105710	8176	3.9125409	8213	3.9145029

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
214	3.9145547	8251	3.9161066	8288	3.9184497
215	3.9146076	8252	3.9161592	8289	3.9185027
216	3.9146604	8253	3.9162118	8290	3.9185555
217	3.9147133	8254	3.9162645	8291	3.9186089
218	3.9147661	8255	3.9163171	8292	3.9186623
219	3.9148190	8256	3.9163697	8293	3.9187157
220	3.9148718	8257	3.9164223	8294	3.9187690
221	3.9149246	8258	3.9164749	8295	3.9188224
222	3.9149775	8259	3.9165275	8296	3.9188757
223	3.9150303	8260	3.9165800	8297	3.9189291
224	3.9150831	8261	3.9170326	8298	3.9189734
225	3.9151359	8262	3.9170852	8299	3.9190258
226	3.9151887	8263	3.9171378	8300	3.9190781
227	3.9152415	8264	3.9171903	8301	3.9191304
228	3.9152943	8265	3.9172429	8302	3.9191827
229	3.9153471	8266	3.9172954	8303	3.9192350
230	3.9153998	8267	3.9173479	8304	3.9192873
231	3.9154526	8268	3.9174005	8305	3.9193396
232	3.9155054	8269	3.9174530	8306	3.9193919
233	3.9155581	8270	3.9175059	8307	3.9194442
234	3.9156109	8271	3.9175580	8308	3.9194965
235	3.9156636	8272	3.9176105	8309	3.9195488
236	3.9157163	8273	3.9176630	8310	3.9196010
237	3.9157691	8274	3.9177155	8311	3.9196533
238	3.9158218	8275	3.9177680	8312	3.9197055
239	3.9158745	8276	3.9178205	8313	3.9197578
240	3.9159272	8277	3.9178730	8314	3.9198100
241	3.9159799	8278	3.9179254	8315	3.9198623
242	3.9160326	8279	3.9179779	8316	3.9199145
243	3.9160853	8280	3.9180303	8317	3.9199667
244	3.9161380	8281	3.9180828	8318	3.9200189
245	3.9161907	8282	3.9181352	8319	3.9200711
246	3.9162433	8283	3.9181877	8320	3.9201233
247	3.9162960	8284	3.9182401	8321	3.9201755
248	3.9163487	8285	3.9182925	8322	3.9202277
249	3.9164013	8286	3.9183440	8323	3.9202799
250	3.9164539	8287	3.9183973	8324	3.9203321

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8325	3.9203842	8362	3.9223102	8399	3.9243376
8326	3.9204364	8363	3.9223621	8400	3.9243793
8327	3.9204886	8364	3.9224140	8401	3.9244310
8328	3.9205407	8365	3.9224659	8402	3.9244827
8329	3.9205929	8366	3.9225179	8403	3.9245344
8330	3.9206450	8367	3.9225698	8404	3.9245860
8331	3.9206971	8368	3.9226217	8405	3.9246377
8332	3.9207493	8369	3.9226736	8406	3.9246894
8333	3.9208014	8370	3.9227255	8407	3.9247410
8334	3.9208535	8371	3.9227773	8408	3.9247927
8335	3.9209056	8372	3.9228292	8409	3.9248444
8336	3.9209577	8373	3.9228811	8410	3.9248960
8337	3.9210098	8374	3.9229330	8411	3.9249476
8338	3.9210619	8375	3.9229848	8412	3.9249993
8339	3.9211140	8376	3.9230367	8413	3.9250509
8340	3.9211661	8377	3.9230885	8414	3.9251025
8341	3.9212181	8378	3.9231404	8415	3.9251541
8342	3.9212702	8379	3.9231922	8416	3.9252057
8343	3.9213222	8380	3.9232440	8417	3.9252573
8344	3.9213743	8381	3.9232958	8418	3.9253089
8345	3.9214263	8382	3.9233477	8419	3.9253605
8346	3.9214784	8383	3.9233995	8420	3.9254121
8347	3.9215304	8384	3.9234513	8421	3.9254637
8348	3.9215824	8385	3.9235031	8422	3.9255153
8349	3.9216345	8386	3.9235549	8423	3.9255669
8350	3.9216865	8387	3.9236066	8424	3.9256185
8351	3.9217385	8388	3.9236584	8425	3.9256701
8352	3.9217905	8389	3.9237102	8426	3.9257217
8353	3.9218425	8390	3.9237620	8427	3.9257733
8354	3.9218945	8391	3.9238137	8428	3.9258249
8355	3.9219465	8392	3.9238655	8429	3.9258765
8356	3.9219984	8393	3.9239172	8430	3.9259281
8357	3.9220504	8394	3.9239690	8431	3.9259797
8358	3.9221024	8395	3.9240207	8432	3.9260313
8359	3.9221543	8396	3.9240724	8433	3.9260829
8360	3.9222063	8397	3.9241242	8434	3.9261345
8361	3.9222582	8398	3.9241759	8435	3.9261861

Nam. Logarithm.	Nam. Logarithm.	Nam. Logarithm.
8436 3.9261366	8473 3.9280372	8510 3.9299296
8437 3.9261880	8474 3.9280885	8511 3.9299806
8438 3.9262395	8475 3.9281397	8512 3.9300316
8439 3.9262910	8476 3.9281909	8513 3.9300826
8440 3.9263424	8477 3.9282422	8514 3.9301335
8441 3.9263939	8478 3.9282934	8515 3.9301847
8442 3.9264453	8479 3.9283446	8516 3.9302357
8443 3.9264968	8480 3.9283959	8517 3.9302866
8444 3.9265482	8481 3.9284471	8518 3.9303376
8445 3.9265997	8482 3.9284983	8519 3.9303886
8446 3.9266511	8483 3.9285495	8520 3.9304396
8447 3.9267025	8484 3.9286007	8521 3.9304906
8448 3.9267539	8485 3.9286518	8522 3.9305415
8449 3.9268053	8486 3.9287030	8523 3.9305925
8450 3.9268567	8487 3.9287542	8524 3.9306434
8451 3.9269081	8488 3.9288054	8525 3.9306944
8452 3.9269595	8489 3.9288565	8526 3.9307453
8453 3.9270109	8490 3.9289077	8527 3.9307963
8454 3.9270623	8491 3.9289588	8528 3.9308472
8455 3.9271136	8492 3.9290100	8529 3.9308981
8456 3.9271650	8493 3.9290611	8530 3.9309490
8457 3.9272163	8494 3.9291123	8531 3.9309999
8458 3.9272677	8495 3.9291634	8532 3.9310508
8459 3.9273190	8496 3.9292145	8533 3.9311017
8460 3.9273704	8497 3.9292656	8534 3.9311526
8461 3.9274217	8498 3.9293167	8535 3.9312035
8462 3.9274730	8499 3.9293678	8536 3.9312544
8463 3.9275243	8500 3.9294189	8537 3.9313053
8464 3.9275757	8501 3.9294700	8538 3.9313561
8465 3.9276270	8502 3.9295211	8539 3.9314070
8466 3.9276783	8503 3.9295722	8540 3.9314579
8467 3.9277296	8504 3.9296233	8541 3.9315087
8468 3.9277808	8505 3.9296743	8542 3.9315596
8469 3.9278321	8506 3.9297254	8543 3.9316104
8470 3.9278834	8507 3.9297764	8544 3.9316612
8471 3.9279347	8508 3.9298275	8545 3.9317121
8472 3.9279859	8509 3.9298785	8546 3.9317629

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8547	3.9318137	8584	3.9336897	8621	3.9355576
8548	3.9318645	8585	3.9337403	8622	3.9356080
8549	3.9319153	8586	3.9337909	8623	3.9356584
8550	3.9319661	8587	3.9338415	8624	3.9357087
8551	3.9320169	8588	3.9338920	8625	3.9357591
8552	3.9320677	8589	3.9339426	8626	3.9358095
8553	3.9321185	8590	3.9339932	8627	3.9358598
8554	3.9321692	8591	3.9340437	8628	3.9359101
8555	3.9322200	8592	3.9340943	8629	3.9359605
8556	3.9322708	8593	3.9341448	8630	3.9360108
8557	3.9323215	8594	3.9341953	8631	3.9360611
8558	3.9323723	8595	3.9342459	8632	3.9361114
8559	3.9324230	8596	3.9342964	8633	3.9361617
8560	3.9324738	8597	3.9343469	8634	3.9362120
8561	3.9325245	8598	3.9343974	8635	3.9362623
8562	3.9325752	8599	3.9344479	8636	3.9363126
8563	3.9326259	8600	3.9344984	8637	3.9363629
8564	3.9326767	8601	3.9345489	8638	3.9364132
8565	3.9327274	8602	3.9345994	8639	3.9364635
8566	3.9327781	8603	3.9346499	8640	3.9365137
8567	3.9328288	8604	3.9347004	8641	3.9365640
8568	3.9328795	8605	3.9347509	8642	3.9366143
8569	3.9329301	8606	3.9348013	8643	3.9366645
8570	3.9329808	8607	3.9348518	8644	3.9367148
8571	3.9330315	8608	3.9349023	8645	3.9367650
8572	3.9330822	8609	3.9349527	8646	3.9368152
8573	3.9331328	8610	3.9350032	8647	3.9368655
8574	3.9331835	8611	3.9350535	8648	3.9369157
8575	3.9332341	8612	3.9351040	8649	3.9369659
8576	3.9332848	8613	3.9351544	8650	3.9370161
8577	3.9333354	8614	3.9352040	8651	3.9370663
8578	3.9333860	8615	3.9352553	8652	3.9371165
8579	3.9334367	8616	3.9353057	8653	3.9371667
8580	3.9334873	8617	3.9353561	8654	3.9372169
8581	3.9335379	8618	3.9354065	8655	3.9372671
8582	3.9335885	8619	3.9354569	8656	3.9373173
8583	3.9336391	8620	3.9355073	8657	3.9373674

Nam. Logarithm.	Nam. Logarithm.	Nam. Logarithm.
8658 3.9374176	8695 3.9392695	8732 3.9411137
8659 3.9374677	8696 3.9393195	8733 3.9411638
8660 3.9375179	8697 3.9393695	8734 3.9412132
8661 3.9375680	8698 3.9394194	8735 3.9412629
8662 3.9376182	8699 3.9394693	8736 3.9413126
8663 3.9376683	8700 3.9395193	8737 3.9413623
8664 3.9377184	8701 3.9395692	8738 3.9414120
8665 3.9377686	8702 3.9396191	8739 3.9414617
8666 3.9378187	8703 3.9396690	8740 3.9415114
8667 3.9378688	8704 3.9397189	8741 3.9415611
8668 3.9379189	8705 3.9397688	8742 3.9416108
8669 3.9379690	8706 3.9398187	8743 3.9416605
8670 3.9380191	8707 3.9398685	8744 3.9417101
8671 3.9380692	8708 3.9399184	8745 3.9417598
8672 3.9381193	8709 3.9399683	8746 3.9418095
8673 3.9381693	8710 3.9400182	8747 3.9418591
8674 3.9382194	8711 3.9400680	8748 3.9419088
8675 3.9382695	8712 3.9401179	8749 3.9419584
8676 3.9383195	8713 3.9401677	8750 3.9420081
8677 3.9383696	8714 3.9402176	8751 3.9420577
8678 3.9384196	8715 3.9402674	8752 3.9421073
8679 3.9384697	8716 3.9403172	8753 3.9421569
8680 3.9385197	8717 3.9403670	8754 3.9422065
8681 3.9385698	8718 3.9404169	8755 3.9422561
8682 3.9386198	8719 3.9404667	8756 3.9423058
8683 3.9386698	8720 3.9405165	8757 3.9423553
8684 3.9387198	8721 3.9405663	8758 3.9424049
8685 3.9387698	8722 3.9406161	8759 3.9424545
8686 3.9388198	8723 3.9406659	8760 3.9425041
8687 3.9388698	8724 3.9407157	8761 3.9425537
8688 3.9389198	8725 3.9407654	8762 3.9426032
8689 3.9389698	8726 3.9408152	8763 3.9426528
8690 3.9390198	8727 3.9408650	8764 3.9427024
8691 3.9390697	8728 3.9409147	8765 3.9427519
8692 3.9391197	8729 3.9409645	8766 3.9428015
8693 3.9391697	8730 3.9410142	8767 3.9428510
8694 3.9392196	8731 3.9410640	8768 3.9429005

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8769	3.9429401	8806	3.9447787	8843	3.9465996
8770	3.9429996	8807	3.9448280	8844	3.9466487
8771	3.9430491	8808	3.9448773	8845	3.9466978
8772	3.9430986	8809	3.9449266	8846	3.9467469
8773	3.9431481	8810	3.9449759	8847	3.9467960
8774	3.9431976	8811	3.9450252	8848	3.9468451
8775	3.9432471	8812	3.9450745	8849	3.9468942
8776	3.9432966	8813	3.9451238	8850	3.9469433
8777	3.9433461	8814	3.9451730	8851	3.9469923
8778	3.9433956	8815	3.9452223	8852	3.9470414
8779	3.9434450	8816	3.9452716	8853	3.9470905
8780	3.9434945	8817	3.9453208	8854	3.9471395
8781	3.9435440	8818	3.9453701	8855	3.9471886
8782	3.9435934	8819	3.9454193	8856	3.9472376
8783	3.9436429	8820	3.9454686	8857	3.9472866
8784	3.9436923	8821	3.9455178	8858	3.9473357
8785	3.9437418	8822	3.9455671	8859	3.9473847
8786	3.9437912	8823	3.9456163	8860	3.9474337
8787	3.9438406	8824	3.9456655	8861	3.9474827
8788	3.9438900	8825	3.9457147	8862	3.9475317
8789	3.9439395	8826	3.9457639	8863	3.9475807
8790	3.9439889	8827	3.9458131	8864	3.9476297
8791	3.9440383	8828	3.9458623	8865	3.9476787
8792	3.9440877	8829	3.9459115	8866	3.9477277
8793	3.9441371	8830	3.9459607	8867	3.9477767
8794	3.9441865	8831	3.9460099	8868	3.9478257
8795	3.9442358	8832	3.9460591	8869	3.9478747
8796	3.9442852	8833	3.9461082	8870	3.9479236
8797	3.9443346	8834	3.9461574	8871	3.9479726
8798	3.9443840	8835	3.9462066	8872	3.9480215
8799	3.9444333	8836	3.9462557	8873	3.9480705
8800	3.9444827	8837	3.9463048	8874	3.9481194
8801	3.9445320	8838	3.9463540	8875	3.9481684
8802	3.9445814	8839	3.9464031	8876	3.9482173
8803	3.9446307	8840	3.9464523	8877	3.9482662
8804	3.9446800	8841	3.9465014	8878	3.9483151
8805	3.9447294	8842	3.9465505	8879	3.9483641

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8880	3.9484130	8917	3.9502188	8954	3.9520178
8881	3.9484619	8918	3.9502675	8955	3.9520656
8882	3.9485108	8919	3.9503162	8956	3.9521141
8883	3.9485597	8920	3.9503649	8957	3.9521626
8884	3.9486085	8921	3.9504135	8958	3.9522111
8885	3.9486574	8922	3.9504622	8959	3.9522595
8886	3.9487063	8923	3.9505109	8960	3.9523080
8887	3.9487552	8924	3.9505596	8961	3.9523565
8888	3.9488040	8925	3.9506082	8962	3.9524049
8889	3.9488529	8926	3.9506569	8963	3.9524534
8890	3.9489018	8927	3.9507055	8964	3.9525018
8891	3.9489506	8928	3.9507542	8965	3.9525503
8892	3.9489995	8929	3.9508028	8966	3.9525987
8893	3.9490483	8930	3.9508515	8967	3.9526472
8894	3.9490971	8931	3.9509001	8968	3.9526956
8895	3.9491460	8932	3.9509487	8969	3.9527440
8896	3.9491948	8933	3.9509973	8970	3.9527924
8897	3.9492436	8934	3.9510459	8971	3.9528409
8898	3.9492924	8935	3.9510946	8972	3.9528893
8899	3.9493412	8936	3.9511432	8973	3.9529377
8900	3.9493900	8937	3.9511918	8974	3.9529861
8901	3.9494388	8938	3.9512404	8975	3.9530345
8902	3.9494876	8939	3.9512889	8976	3.9530828
8903	3.9495364	8940	3.9513375	8977	3.9531312
8904	3.9495852	8941	3.9513861	8978	3.9531796
8905	3.9496339	8942	3.9514347	8979	3.9532280
8906	3.9496827	8943	3.9514832	8980	3.9532763
8907	3.9497315	8944	3.9515318	8981	3.9533247
8908	3.9497802	8945	3.9515803	8982	3.9533730
8909	3.9498290	8946	3.9516289	8983	3.9534214
8910	3.9498777	8947	3.9516774	8984	3.9534697
8911	3.9499264	8948	3.9517260	8985	3.9535181
8912	3.9499752	8949	3.9517745	8986	3.9535664
8913	3.9500239	8950	3.9518230	8987	3.9536147
8914	3.9500726	8951	3.9518716	8988	3.9536631
8915	3.9501213	8952	3.9519201	8989	3.9537114
8916	3.9501701	8953	3.9519686	8990	3.9537597

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
8991	3.9538080	9028	3.9555915	9065	3.9573678
8992	3.9538563	9029	3.9556397	9066	3.9574157
8993	3.9539046	9030	3.9556877	9067	3.9574636
8994	3.9539529	9031	3.9557358	9068	3.9575115
8995	3.9540012	9032	3.9557839	9069	3.9575594
8996	3.9540494	9033	3.9558320	9070	3.9576073
8997	3.9540977	9034	3.9558801	9071	3.9576552
8998	3.9541460	9035	3.9559282	9072	3.9577030
8999	3.9541943	9036	3.9559762	9073	3.9577509
9000	3.9542425	9037	3.9560243	9074	3.9577988
9001	3.9542908	9038	3.9560723	9075	3.9578466
9002	3.9543390	9039	3.9561204	9076	3.9578945
9003	3.9543872	9040	3.9561684	9077	3.9579423
9004	3.9544355	9041	3.9562165	9078	3.9579902
9005	3.9544837	9042	3.9562645	9079	3.9580380
9006	3.9545319	9043	3.9563125	9080	3.9580858
9007	3.9545802	9044	3.9563606	9081	3.9581337
9008	3.9546284	9045	3.9564086	9082	3.9581815
9009	3.9546766	9046	3.9564566	9083	3.9582293
9010	3.9547248	9047	3.9565046	9084	3.9582771
9011	3.9547730	9048	3.9565526	9085	3.9583249
9012	3.9548212	9049	3.9566006	9086	3.9583727
9013	3.9548694	9050	3.9566486	9087	3.9584205
9014	3.9549176	9051	3.9566966	9088	3.9584683
9015	3.9549657	9052	3.9567445	9089	3.9585161
9016	3.9550139	9053	3.9567925	9090	3.9585639
9017	3.9550621	9054	3.9568405	9091	3.9586117
9018	3.9551102	9055	3.9568885	9092	3.9586594
9019	3.9551584	9056	3.9569364	9093	3.9587072
9020	3.9552065	9057	3.9569844	9094	3.9587549
9021	3.9552547	9058	3.9570323	9095	3.9588027
9022	3.9553028	9059	3.9570803	9096	3.9588505
9023	3.9553510	9060	3.9571282	9097	3.9588982
9024	3.9553991	9061	3.9571761	9098	3.9589459
9025	3.9554472	9062	3.9572241	9099	3.9589937
9026	3.9554953	9063	3.9572720	9100	3.9590414
9027	3.9555434	9064	3.9573199	9101	3.9590891

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9102	3.9591368	9139	3.9608927	9176	3.9626534
9103	3.9591845	9140	3.9609462	9177	3.9627007
9104	3.9592322	9141	3.9609927	9178	3.9627481
9105	3.9592799	9142	3.9610412	9179	3.9627954
9106	3.9593276	9143	3.9610887	9180	3.9628427
9107	3.9593753	9144	3.9611362	9181	3.9628900
9108	3.9594230	9145	3.9611837	9182	3.9629373
9109	3.9594707	9146	3.9612312	9183	3.9629846
9110	3.9595184	9147	3.9612787	9184	3.9630319
9111	3.9595660	9148	3.9613262	9185	3.9630792
9112	3.9596137	9149	3.9613736	9186	3.9631264
9113	3.9596614	9150	3.9614211	9187	3.9631737
9114	3.9597090	9151	3.9614686	9188	3.9632210
9115	3.9597567	9152	3.9615150	9189	3.9632683
9116	3.9598043	9153	3.9615635	9190	3.9633155
9117	3.9598520	9154	3.9616109	9191	3.9633628
9118	3.9598996	9155	3.9616583	9192	3.9634100
9119	3.9599472	9156	3.9617058	9193	3.9634573
9120	3.9599948	9157	3.9617532	9194	3.9635045
9121	3.9600425	9158	3.9618006	9195	3.9635517
9122	3.9600901	9159	3.9618481	9196	3.9635990
9123	3.9601377	9160	3.9618955	9197	3.9636462
9124	3.9601853	9161	3.9619429	9198	3.9636934
9125	3.9602329	9162	3.9619903	9199	3.9637405
9126	3.9602805	9163	3.9620377	9200	3.9637878
9127	3.9603280	9164	3.9620851	9201	3.9638350
9128	3.9603756	9165	3.9621325	9202	3.9638822
9129	3.9604232	9166	3.9621799	9203	3.9639294
9130	3.9604708	9167	3.9622272	9204	3.9639766
9131	3.9605183	9168	3.9622746	9205	3.9640238
9132	3.9605659	9169	3.9623220	9206	3.9640710
9133	3.9606135	9170	3.9623693	9207	3.9641181
9134	3.9606610	9171	3.9624167	9208	3.9641653
9135	3.9607086	9172	3.9624640	9209	3.9642125
9136	3.9607561	9173	3.9625114	9210	3.9642596
9137	3.9608036	9174	3.9625587	9211	3.9643068
9138	3.9608512	9175	3.9626051	9212	3.9643539

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9213	3.9644011	9250	3.9661417	9287	3.9678754
9214	3.9644482	9251	3.9661887	9288	3.9679222
9215	3.9644953	9252	3.9662356	9289	3.9679690
9216	3.9645425	9253	3.9662826	9290	3.9680157
9217	3.9645896	9254	3.9663295	9291	3.9680625
9218	3.9646367	9255	3.9663764	9292	3.9681092
9219	3.9646838	9256	3.9664233	9293	3.9681559
9220	3.9647309	9257	3.9664703	9294	3.9682027
9221	3.9647780	9258	3.9665172	9295	3.9682496
9222	3.9648251	9259	3.9665641	9296	3.9682961
9223	3.9648722	9260	3.9666110	9297	3.9683428
9224	3.9649193	9261	3.9666579	9298	3.9683895
9225	3.9649664	9262	3.9667048	9299	3.9684362
9226	3.9650134	9263	3.9667517	9300	3.9684831
9227	3.9650605	9264	3.9667985	9301	3.9685296
9228	3.9651076	9265	3.9668454	9302	3.9685763
9229	3.9651546	9266	3.9668923	9303	3.9686230
9230	3.9652017	9267	3.9669392	9304	3.9686697
9231	3.9652488	9268	3.9669860	9305	3.9687164
9232	3.9652958	9269	3.9670329	9306	3.9687630
9233	3.9653428	9270	3.9670797	9307	3.9688097
9234	3.9653899	9271	3.9671266	9308	3.9688564
9235	3.9654369	9272	3.9671734	9309	3.9689030
9236	3.9654839	9273	3.9672203	9310	3.9689497
9237	3.9655309	9274	3.9672671	9311	3.9689964
9238	3.9655780	9275	3.9673139	9312	3.9690430
9239	3.9656250	9276	3.9673607	9313	3.9690896
9240	3.9656720	9277	3.9674076	9314	3.9691362
9241	3.9657190	9278	3.9674544	9315	3.9691829
9242	3.9657660	9279	3.9675012	9316	3.9692295
9243	3.9658130	9280	3.9675480	9317	3.9692761
9244	3.9658599	9281	3.9675948	9318	3.9693227
9245	3.9659069	9282	3.9676416	9319	3.9693693
9246	3.9659539	9283	3.9676883	9320	3.9694159
9247	3.9660009	9284	3.9677351	9321	3.9694625
9248	3.9660478	9285	3.9677819	9322	3.9695091
9249	3.9660948	9286	3.9678287	9323	3.9695557

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Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9324	3.9656023	9361	3.9713222	9398	3.9730354
9325	3.9656488	9362	3.9713686	9399	3.9730816
9326	3.9656954	9363	3.9714150	9400	3.9731279
9327	3.9657420	9364	3.9714614	9401	3.9731741
9328	3.9657885	9365	3.9715078	9402	3.9732202
9329	3.9658351	9366	3.9715542	9403	3.9732664
9330	3.9658816	9367	3.9716005	9404	3.9733126
9331	3.9659282	9368	3.9716469	9405	3.9733588
9332	3.9659747	9369	3.9716932	9406	3.9734050
9333	3.9700213	9370	3.9717396	9407	3.9734511
9334	3.9700678	9371	3.9717859	9408	3.9734973
9335	3.9701143	9372	3.9718323	9409	3.9735435
9336	3.9701608	9373	3.9718786	9410	3.9735896
9337	3.9702074	9374	3.9719249	9411	3.9736358
9338	3.9702539	9375	3.9719713	9412	3.9736819
9339	3.9703004	9376	3.9720176	9413	3.9737281
9340	3.9703459	9377	3.9720639	9414	3.9737742
9341	3.9703934	9378	3.9721102	9415	3.9738203
9342	3.9704399	9379	3.9721565	9416	3.9738664
9343	3.9704863	9380	3.9722028	9417	3.9739126
9344	3.9705328	9381	3.9722491	9418	3.9739587
9345	3.9705793	9382	3.9722954	9419	3.9740048
9346	3.9706258	9383	3.9723417	9420	3.9740509
9347	3.9706722	9384	3.9723880	9421	3.9740970
9348	3.9707187	9385	3.9724343	9422	3.9741431
9349	3.9707652	9386	3.9724805	9423	3.9741892
9350	3.9708116	9387	3.9725268	9424	3.9742353
9351	3.9708581	9388	3.9725731	9425	3.9742814
9352	3.9709045	9389	3.9726193	9426	3.9743274
9353	3.9709509	9390	3.9726656	9427	3.9743735
9354	3.9709974	9391	3.9727118	9428	3.9744196
9355	3.9710438	9392	3.9727581	9429	3.9744656
9356	3.9710902	9393	3.9728043	9430	3.9745117
9357	3.9711366	9394	3.9728506	9431	3.9745577
9358	3.9711830	9395	3.9728968	9432	3.9746038
9359	3.9712294	9396	3.9729430	9433	3.9746498
9360	3.9712758	9397	3.9729892	9434	3.9746959

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9435	3.9747419	9472	3.9764417	9509	3.9781348
9436	3.9747879	9473	3.9764875	9510	3.9781809
9437	3.9748340	9474	3.9765334	9511	3.9782262
9438	3.9748800	9475	3.9765792	9512	3.9782718
9439	3.9749260	9476	3.9766251	9513	3.9783175
9440	3.9749720	9477	3.9766709	9514	3.9783631
9441	3.9750180	9478	3.9767167	9515	3.9784088
9442	3.9750640	9479	3.9767625	9516	3.9784544
9443	3.9751100	9480	3.9768083	9517	3.9785001
9444	3.9751560	9481	3.9768541	9518	3.9785457
9445	3.9752020	9482	3.9768999	9519	3.9785913
9446	3.9752479	9483	3.9769457	9520	3.9786369
9447	3.9752939	9484	3.9769915	9521	3.9786826
9448	3.9753399	9485	3.9770373	9522	3.9787282
9449	3.9753858	9486	3.9770831	9523	3.9787738
9450	3.9754318	9487	3.9771289	9524	3.9788194
9451	3.9754778	9488	3.9771747	9525	3.9788650
9452	3.9755237	9489	3.9772204	9526	3.9789106
9453	3.9755697	9490	3.9772662	9527	3.9789562
9454	3.9756156	9491	3.9773120	9528	3.9790017
9455	3.9756615	9492	3.9773577	9529	3.9790473
9456	3.9757075	9493	3.9774035	9530	3.9790929
9457	3.9757534	9494	3.9774492	9531	3.9791385
9458	3.9757993	9495	3.9774950	9532	3.9791840
9459	3.9758452	9496	3.9775407	9533	3.9792296
9460	3.9758911	9497	3.9775864	9534	3.9792751
9461	3.9759370	9498	3.9776322	9535	3.9793207
9462	3.9759829	9499	3.9776779	9536	3.9793662
9463	3.9760288	9500	3.9777236	9537	3.9794118
9464	3.9760747	9501	3.9777693	9538	3.9794573
9465	3.9761206	9502	3.9778150	9539	3.9795028
9466	3.9761665	9503	3.9778607	9540	3.9795484
9467	3.9762124	9504	3.9779064	9541	3.9795939
9468	3.9762582	9505	3.9779521	9542	3.9796394
9469	3.9763041	9506	3.9779978	9543	3.9796849
9470	3.9763500	9507	3.9780435	9544	3.9797304
9471	3.9763958	9508	3.9780892	9545	3.9797759

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9546	3.9798214	9584	3.9815468	9622	3.9831654
9547	3.9798669	9585	3.9815921	9623	3.9833105
9548	3.9799124	9586	3.9816374	9624	3.9833556
9559	3.9799579	9587	3.9816827	9625	3.9834007
9550	3.9800034	9588	3.9817280	9626	3.9834459
9551	3.9800488	9589	3.9817733	9627	3.9834910
9552	3.9800943	9590	3.9818186	9628	3.9835361
9553	3.9801398	9591	3.9818639	9629	3.9835812
9554	3.9801852	9592	3.9819092	9630	3.9836263
9555	3.9802307	9593	3.9819544	9631	3.9836714
9556	3.9802761	9594	3.9819997	9632	3.9837165
9557	3.9803216	9595	3.9820450	9633	3.9837616
9558	3.9803670	9596	3.9820902	9634	3.9838066
9559	3.9804125	9597	3.9821355	9635	3.9838517
9560	3.9804579	9598	3.9821807	9636	3.9838968
9561	3.9805033	9599	3.9822260	9637	3.9839419
9562	3.9805487	9600	3.9822712	9638	3.9839869
9563	3.9805942	9601	3.9823165	9639	3.9840320
9564	3.9806396	9602	3.9823617	9640	3.9840770
9565	3.9806850	9603	3.9824069	9641	3.9841221
9566	3.9807304	9604	3.9824522	9642	3.9841671
9567	3.9807758	9605	3.9824974	9643	3.9842122
9568	3.9808212	9606	3.9825426	9644	3.9842572
9579	3.9808666	9607	3.9825878	9645	3.9843022
9570	3.9809119	9608	3.9826330	9646	3.9843473
9571	3.9809573	9609	3.9826782	9647	3.9843923
9572	3.9810027	9610	3.9827234	9648	3.9844373
9573	3.9810481	9611	3.9827686	9649	3.9844823
9574	3.9810934	9612	3.9828138	9650	3.9845273
9575	3.9811388	9613	3.9828589	9651	3.9845723
9576	3.9811841	9614	3.9829041	9652	3.9846173
9577	3.9812295	9615	3.9829493	9653	3.9846623
9578	3.9812748	9616	3.9829945	9654	3.9847073
9579	3.9813202	9617	3.9830396	9655	3.9847523
9580	3.9813655	9618	3.9830848	9656	3.9847973
9581	3.9814108	9619	3.9831299	9657	3.9848422
9582	3.9814562	9620	3.9831751	9658	3.9848872
9583	3.9815015	9621	3.9832203	9659	3.9849322

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9650	3.9849771	9700	3.9866822	9736	3.9883808
9661	3.9850221	9709	3.9867270	9737	3.9884252
9662	3.9850670	9710	3.9867717	9738	3.9884698
9663	3.9851120	9701	3.9868165	9739	3.9885144
9664	3.9851569	9702	3.9868613	9740	3.9885590
9665	3.9852019	9703	3.9869060	9741	3.9886035
9666	3.9852468	9704	3.9869508	9742	3.9886481
9667	3.9852917	9705	3.9869955	9743	3.9886927
9668	3.9853366	9706	3.9870403	9744	3.9887373
9669	3.9853816	9707	3.9870850	9745	3.9887818
9670	3.9854265	9708	3.9871298	9746	3.9888264
9671	3.9854714	9709	3.9871745	9747	3.9888710
9672	3.9855163	9710	3.9872192	9748	3.9889155
9673	3.9855612	9711	3.9872640	9749	3.9889601
9674	3.9856061	9712	3.9873087	9750	3.9890046
9675	3.9856510	9713	3.9873534	9751	3.9890492
9676	3.9856959	9714	3.9873981	9752	3.9890937
9677	3.9857407	9715	3.9874428	9753	3.9891382
9678	3.9857856	9716	3.9874875	9754	3.9891828
9679	3.9858305	9717	3.9875322	9755	3.9892273
9680	3.9858754	9718	3.9875769	9756	3.9892718
9681	3.9859202	9719	3.9876216	9757	3.9893163
9682	3.9859651	9720	3.9876663	9758	3.9893608
9683	3.9860099	9721	3.9877109	9759	3.9894053
9684	3.9860548	9722	3.9877556	9760	3.9894498
9685	3.9860996	9723	3.9878003	9761	3.9894943
9686	3.9861445	9724	3.9878449	9762	3.9895388
9687	3.9861893	9725	3.9878896	9763	3.9895833
9688	3.9862341	9726	3.9879343	9764	3.9896278
9689	3.9862790	9727	3.9879789	9765	3.9896722
9690	3.9863238	9728	3.9880236	9766	3.9897167
9691	3.9863686	9729	3.9880682	9767	3.9897612
9692	3.9864134	9730	3.9881128	9768	3.9898056
9693	3.9864582	9731	3.9881575	9769	3.9898501
9694	3.9865030	9732	3.9882021	9770	3.9898946
9695	3.9865478	9733	3.9882467	9771	3.9899390
9696	3.9865926	9734	3.9882913	9772	3.9899835
9697	3.9866374	9735	3.9883360	9773	3.9900279

Nam.	Logarithm.	Nam.	Logarithm.	Nam.	Logarithm.
9774	3.9900723	9812	3.9917474	9850	3.9934362
9775	3.9901168	9813	3.9918009	9851	3.9934803
9776	3.9901612	9814	3.9918543	9852	3.9935244
9777	3.9902056	9815	3.9918980	9853	3.9935685
9778	3.9902500	9816	3.9919415	9854	3.9936126
9779	3.9902944	9817	3.9919788	9855	3.9936566
9780	3.9903389	9818	3.9920230	9856	3.9937007
9781	3.9903833	9819	3.9920673	9857	3.9937448
9782	3.9904277	9820	3.9921115	9858	3.9937888
9783	3.9904721	9821	3.9921557	9859	3.9938329
9784	3.9905164	9822	3.9921999	9860	3.9938769
9785	3.9905608	9823	3.9922441	9861	3.9939210
9786	3.9906052	9824	3.9922884	9862	3.9939650
9787	3.9906496	9825	3.9923326	9863	3.9940090
9788	3.9906940	9826	3.9923768	9864	3.9940531
9789	3.9907383	9827	3.9924210	9865	3.9940971
9790	3.9907827	9828	3.9924651	9866	3.9941411
9791	3.9908270	9829	3.9925093	9867	3.9941851
9792	3.9908714	9830	3.9925535	9868	3.9942291
9793	3.9909158	9831	3.9925977	9869	3.9942731
9794	3.9909601	9832	3.9926419	9870	3.9943172
9795	3.9910044	9833	3.9926860	9871	3.9943612
9796	3.9910488	9834	3.9927302	9872	3.9944051
9797	3.9910931	9835	3.9927744	9873	3.9944491
9798	3.9911374	9836	3.9928185	9874	3.9944931
9799	3.9911818	9837	3.9928627	9875	3.9945371
9800	3.9912261	9838	3.9929068	9876	3.9945811
9801	3.9912704	9839	3.9929510	9877	3.9946251
9802	3.9913147	9840	3.9929951	9878	3.9946690
9803	3.9913590	9841	3.9930392	9879	3.9947130
9804	3.9914033	9842	3.9930834	9880	3.9947569
9805	3.9914476	9843	3.9931275	9881	3.9948009
9806	3.9914919	9844	3.9931716	9882	3.9948448
9807	3.9915362	9845	3.9932157	9883	3.9948888
9808	3.9915805	9846	3.9932598	9884	3.9949327
9809	3.9916247	9847	3.9933039	9885	3.9949767
9810	3.9916690	9848	3.9933480	9886	3.9950206
9811	3.9917133	9849	3.9933921	9887	3.9950645

Num.	Logarithm.	Num.	Logarithm.	Num.	Logarithm.
9828	3.9951085	9926	3.9967743	9963	3.9983910
9829	3.9951524	9927	3.9968180	9964	3.9984337
9830	3.9951963	9928	3.9968618	9965	3.9984773
9831	3.9952402	9929	3.9969055	9966	3.9985209
9832	3.9952841	9930	3.9969492	9967	3.9985643
9833	3.9953280	9931	3.9969930	9968	3.9986080
9834	3.9953719	9932	3.9970367	9969	3.9986516
9835	3.9954158	9933	3.9970804	9970	3.9986952
9836	3.9954597	9934	3.9971242	9971	3.9987387
9837	3.9955036	9935	3.9971679	9972	3.9987823
9838	3.9955474	9936	3.9972116	9973	3.9988258
9839	3.9955913	9937	3.9972553	9974	3.9988694
9840	3.9956352	9938	3.9972990	9975	3.9989129
9841	3.9956791	9939	3.9973427	9976	3.9989564
9842	3.9957229	9940	3.9973864	9977	3.9990000
9843	3.9957668	9941	3.9974301	9978	3.9990433
9844	3.9958106	9942	3.9974738	9979	3.9990870
9845	3.9958545	9943	3.9975174	9980	3.9991305
9846	3.9958983	9944	3.9975611	9981	3.9991741
9847	3.9959422	9945	3.9976048	9982	3.9992176
9848	3.9959860	9946	3.9976483	9983	3.9992611
9849	3.9960298	9947	3.9976921	9984	3.9993046
9850	3.9960737	9948	3.9977358	9985	3.9993481
9851	3.9961175	9949	3.9977793	9986	3.9993916
9852	3.9961613	9950	3.9978231	9987	3.9994350
9853	3.9962051	9951	3.9978667	9988	3.9994785
9854	3.9962489	9952	3.9979104	9989	3.9995220
9855	3.9962927	9953	3.9979540	9990	3.9995655
9856	3.9963365	9954	3.9979976	9991	3.9996090
9857	3.9963803	9955	3.9980413	9992	3.9996524
9858	3.9964241	9956	3.9980849	9993	3.9996959
9859	3.9964679	9957	3.9981285	9994	3.9997393
9860	3.9965117	9958	3.9981721	9995	3.9997828
9861	3.9965554	9959	3.9982157	9996	3.9998263
9862	3.9965992	9960	3.9982593	9997	3.9998697
9863	3.9966430	9961	3.9983029	9998	3.9999131
9864	3.9966868	9962	3.9983465	9999	3.9999566
9865	3.9967305	9963	3.9983901	10000	4.0000000

The End of the Logarithms.

Table of ... 51 Deg. 12 Min.

Altitude of the Pole { 11 12 } Houses is { 47 }

Q in 222

R. ©	10	11	12	Ascend.	2	3
in				γ	Π	♄
Time.	MD	DD	DD	MD	DD	DD
9	C	20	5	2	50	016
12	1	22	7	4	14	117
17	2	23	9	5	37	218
21	3	24	11	6	56	319
25	4	26	13	8	17	420
29	5	27	15	9	33	520
34	6	29	17	10	49	621
38	7	30	19	12	3	722
42	8	31	21	13	14	823
46	9	3	23	14	21	924
50	10	4	25	15	32	925
54	11	6	27	16	40	1026
58	12	7	29	17	46	1126
2	13	5	31	18	53	1227
6	1	10	3	19	56	1328
10	1	11	4	20	58	1429
14	1	11	6	22	0	1430
18	1	11	8	23	0	1531
22	1	11	10	23	59	161
26	1	11	11	24	59	172
30	2	11	12	25	59	183
34	2	11	14	26	51	184
38	2	11	16	27	47	195
42	2	11	17	28	41	205
46	2	11	19	29	36	216
49	2	11	20	0	29	217
53	2	11	22	1	22	228
57	2	11	23	2	14	239
1	2	11	25	3	5	2410
5	2	11	26	3	56	2410
8	2	11	27	4	45	2511

Q in 222

A.R. ©	10	11	12	Ascend.	2	3
in				γ	Π	♄
Time.	H	M	D	DD	M	DD
22	8	C	3	27	4	45
22	12	1	5	3	5	35
22	16	2	6	30	6	2
22	20	3	7	1	7	1
22	24	4	9	2	8	0
22	27	5	10	4	8	4
22	31	6	12	5	9	3
22	35	7	13	6	10	2
22	39	8	14	7	11	1
22	42	9	16	8	11	5
22	46	10	17	9	10	3
22	50	11	19	10	13	2
22	54	12	20	11	14	7
22	57	13	21	13	14	5
23	1	14	23	14	15	35
23	5	15	24	15	16	17
23	9	16	25	16	17	1
23	12	17	27	17	17	44
23	16	18	28	18	18	26
23	20	19	29	19	19	5
23	23	20	30	19	19	52
23	2	21	2	20	20	32
23	3	22	3	21	21	1
23	34	23	4	22	21	56
23	38	24	5	22	22	37
23	42	25	7	23	23	19
23	45	26	8	23	23	59
24	47	27	9	24	24	3
24	53	28	10	25	25	81
24	56	29	11	26	26	2
24	0	30	12	26	26	42

A Table of the Planets Essential Dignities.

The Use of the Table.

By this Table we and are the Houses of the planets in the Signs of the Zodiac. He is exalted in the Sign of Cancer, has Detriment in the Sign of Capricorn, and his Fall in the Sign of Virgo. The same Method is to be observed in the rest of the Planets.

	Houses	Exaltation	Detriment	Fall
☿	1	♊	♋	♏
♁	2	♈	♏	♊
♂	3	♉	♏	♊
☿	4	♊	♋	♏
♁	5	♈	♏	♊
♂	6	♉	♏	♊
☿	7	♊	♋	♏
♁	8	♈	♏	♊
♂	9	♉	♏	♊
☿	10	♊	♋	♏
♁	11	♈	♏	♊
♂	12	♉	♏	♊

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